

Corporate Networks Programme—Europe Executive Research Bulletins

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A Publication from INPUT's Network Services Programme—Europe

Financial Network Services—Western European Market Development

A key challenge for financial institutions is to develop information systems strategies that support their corporate strategic objectives. Of particular importance is their capability to offer competitive services to their customers, and increasingly, this implies the use of communications networks.

Financial institutions are being compelled to use communications networks to a greater extent both internally and for customer services as a result of two related factors: technological development and deregulation of basic telecommunications carriage. Transmission costs are expected to fall to only 50% of current levels over the next five years, thus driving new network-based applications and services.

These developments, however, are presenting financial institutions with an important challenge. They must either develop these new, more comprehensive communications networks themselves or use third-party services. The deregulation of basic communications carriage will also make possible the resale of services by those organizations that choose to develop their own networks.

This bulletin examines the potential market for third-party network services targeted at the banking and finance sector in Western Europe.

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Exhibit 1

Financial Network Services Market Western Europe 1990-1995

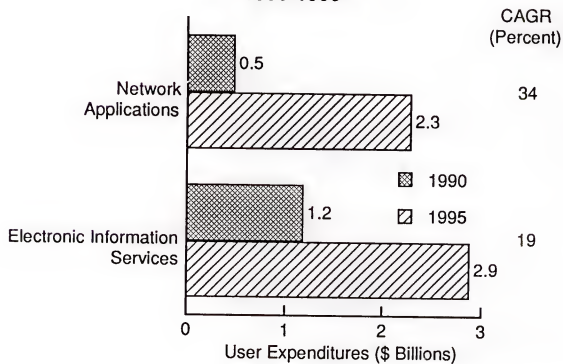


Exhibit 1 shows INPUT's assessment of the financial network market in Western Europe and the estimated growth through 1995 for the two principal subsectors, network applications and electronic information services. Currently, the total financial network services market (\$1.7 billion in 1990) represents nearly 50% of the total market for network services in Western Europe.

The network applications market is made up of two types of services, managed network services and network messaging services. These two subsectors are only now emerging as distinct service categories with different types of vendors targeting separate and distinct user needs. To date, managed network services have usually been part of the provision of messaging services, and have not therefore been a distinct service category of any significance in terms of market size.

Financial institutions represent a potentially significant market for the provision of managed network services since they require a communications infrastructure to deliver specific application services—both for their customers and for their internal operations. In the past, banks and other financial institutions have used the public networks provided by the PPTs or have operated their own private networks over leased lines. However, European banks in particular are beginning seriously to examine the use of managed network services provided by third parties—such as GEIS and Infonet—to meet their rapidly escalating network application needs.

New network capabilities—such as the ability to provide virtual private networks, and the use of fibre optics and possibly ISDN technology—are further increasing the interest of financial institutions in third-party services. Other factors are the problems inherent in interconnecting systems and equipment from different suppliers, and the need for fast packet-switching and voice compression techniques.

Leading third-party service vendors that are introducing these new developments are gaining a considerable competitive advantage. Any financial institution contemplating in-house development must accept the need to make a considerable investment in both network technology and the human skills necessary for designing, building and operating their communications network.

Exhibit 2

Financial Network Service Market Characteristics Western Europe

Subsector	Key Features	Key Vendors
Network Messaging Service	Global capability EDI/Messaging Risk management	Swift GEIS BT-Tymnet
Managed Network Services	Design facilities Operational capability	EDS ⁺ Andersen Consulting IBM
Electronic Information Services	Video Digital	Reuters Telerate Telekurs

Exhibit 2 lists some of the key characteristics of and leading vendors in the financial network services market. This exhibit is categorised by the three subsectors referred to above, and makes a particular distinction between the subsectors of network messaging services and managed network services.

Network messaging services represent a significant part of the financial network services market because of the substantial need for communication of all types—including voice messaging and fax—among financial institutions. Vendors of such services must be able to offer global networking capability because this is increasingly an integrated, international marketplace. Vendors must be able to offer EDI, financial netting services, cash management, global limits management and overall risk control services. The common element in providing these services is the vendor's capability to match and process all these transactions.

The key vendors offering these services in the European market are joined by another set of vendors that are specifically targeting the emerging managed network service opportunity. These vendors are answering the need for basic offerings such as protocol conversion, security and network performance management. Managed network services offers vendors the opportunity to exploit the need for access to different incompatible computer systems with protocol and document conversion. Managed network services will increasingly focus on the provision of a wide range of services from design through operations. The range of facilities offered to clients will be an important competitive issue.

The financial sector is a particularly important target market for managed network services because of financial institutions' need to support services such as automatic teller machines and international payment networks with a

high degree of security and interconnection among users. The challenge for vendors is to offer a service that handles all classes of network service on an end-to-end basis.

Electronic information services definitely represents a distinct subsector of the market, has different requirements from those of the general network applications described above, and is largely provided by a distinct group of vendors. The most profitable segment of this market is that of real-time price quotation services provided to the dealing rooms of financial institutions. Additionally, the financial community uses other network information services—such as historical information from Datastream, company and credit information services from Dun & Bradstreet and news information from Reuters and Dow Jones. Pressure from users for economical access to such data is forcing vendors to utilise new types of delivery mechanisms for these services. The use of video technology and delivery via digital record formats for mixing and integration with other information services are becoming key requirements.

Exhibit 3

Leading Vendors Financial Network Services Western Europe, 1990

Rank	Company	Market Share (Percent)	Estimated Revenues (\$ Millions)
1	Reuters	26	450
2	Telerate	9	150
3	Extel	9	150
4	Telekurs	8	140
5	SWIFT	5	90
6	GEIS	5	80
7	IBM	4	75
8	Telesystemes	3	55
9	Infonet	3	50
10	Datastream	3	50
	Others	25	440
	Total	100	1,730

Exhibit 3 lists the leading financial network services in Western Europe with their estimated 1990 revenues generated by users in the financial sector.

This Research Bulletin is an excerpt from a full research report issued as part of INPUT's Network Services Programme—Europe. If you have questions or comments on this bulletin or wish to purchase the report, please contact Peter Lines at INPUT, Piccadilly House, 33/37 Regent Street, London SW1Y 4NP, England. Tel. (071) 493 9335, Fax (071) 629 0179

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A Publication from INPUT's Network Services Programme—Europe

Managed Network and Messaging Services—Western Europe, 1990-1995

Managed network services provide the user with an independently managed alternative to the public service. Messaging services offer the user an opportunity to interconnect disparate private mail systems with each other and with a variety of public services of differing levels of sophistication.

There are a number of reasons for the dynamic growth of the overall network application services market that encompasses these two sectors and that, as INPUT's research shows, will grow at a CAGR (compound annual growth rate) of 34% over the forecast period 1990 to 1995.

Among several primary driving forces fuelling this growth are:

- The number of personal computers in business and professional use. The majority of PCs are still used on a standalone basis only; network-based services are being used by only a small percentage.
- Integrated services digital networks (ISDN) will develop over the forecast period and be promoted by the European PTTs. ISDN can support integrated

voice/data/image networks and thus facilitate transmission and interchange of information that might otherwise travel by mail or courier. This will accelerate the use of multimedia communications services that become available to run under an ISDN environment.

- Private wide-area networks are available in many large organisations to assist in tying LANs together into tactical communications systems within each organisation and between different organisations. The explosive growth of LANs to connect the plethora of standalone PCs will indirectly, therefore, promote the growth of network services applications over the forecast period.
- The rapid growth of fax, as a replacement for and enhancement of the old-fashioned telex, has spread the use of electronic messaging down the industry pyramid to even the smallest one-man businesses.

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Exhibit 1 lists the key features and key vendors for the two sectors of the market reviewed in depth in INPUT's report, *Managed Network and Messaging Services, Western Europe 1990-1995*.

The complexity of communications networks is increasing rapidly. Only the largest organisations possess the knowledge to operate, maintain and continually enhance these networks by themselves. Business opportunities exist in providing network management skills and control in a variety of ways, such as:

- Remote network management services
- Implementation of network management software
- Professional consulting services associated with planning and performance measurement

The globalisation of the world's economic system is a significant contributor to network services growth. As more business transactions become internationally orientated, a network services capability to support these transactions and their underlying relationships becomes more crucial.

Finally, the development of a global network communications infrastructure in the 1990s will itself stimulate demand for such capabilities. The capacity for rapid transmission of data, voice and images across continents will emerge in the mid-1990s as a powerful impetus for person-to-person, business-to-consumer and business-to-business use of such facilities.

Exhibit 1

Market Sector Characteristics—Western Europe

Subsector	Key Features	Key Vendors
Managed Network Services	Global capabilities Regional capabilities National capabilities Design facilities Operational capability Network Management	DBP Telekom France Telecom BT GEIS EDS Andersen Consulting IBM
Messaging Services	Global capability X.400 Messaging <—> EDI Interface to vertical applications	France Telecom BT (Telecom Gold) GEIS Infonet Swift SITA

As a result of these forces, the markets for managed network and messaging services will grow at rates above that of the overall information services market, i.e., at rates of 25% and 42%, respectively, over the forecast period. This scenario of two fast-growing and interdependent sectors is summarised in Exhibit 2.

Managed Network Services (MNS)

Network services vary in the kinds of value they provide, often serving market segments other than those for which regulation is intended. Private network operators can meet the specific needs of customers to a degree that public network operators, with their statutory requirements for universal provision, are unable to do.

Liberalisation of European telecommunications is allowing private operators to meet specific market demands at competitive prices. Yet, the existence of numerous private networks in the marketplace can and does result in too many standards, each with its own protocols. As a result, widely accepted industry standards have been slow to emerge, and most manufacturers have been reluctant to provide the necessary software to support the entire range of network access protocols. This situation has provided part of the impetus for developing public and private integrated services digital networks (ISDNs), which integrate the communications of a range of equipment through a single network.

The issue of managing pan-European open networks has been complicated by the development of:

- Interworking of national X.25 networks through X.75 gateways at level 3 in the OSI model
- Generic applications of electronic mail (X.400) and electronic directories (X.500) at level 7 of the OSI model.

Effective management of a managed network service requires:

- Diagnostic data to be collected at each of the network process levels
- Effective database handling and management of the data collected
- Reporting of daily and other periodic statistics, and presentation of trends discovered through their analysis
- Interactive management of the network at the session and application levels.

The management of the network processes at the network level (level 3) is rudimentary in open networks (we include in this stricture the X.25 public data networks in Europe). Management at higher levels is nonexistent and has not yet been specified in the OSI model. The management issue is further complicated because multilevel management will be needed within international networks as the traffic load increases:

- Regional level
- Country level
- Continental level
- Intercontinental level.

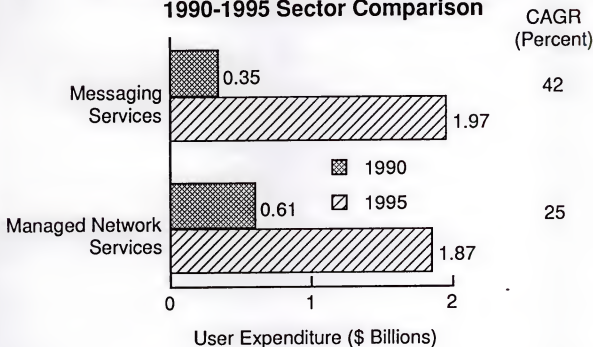
Provision of a private managed network service using limited computer equipment is understood, and yet the implementation task is complex. Provision of a public managed network service based upon a proprietary architecture such as an IBM SNA network can only be achieved with difficulty. IBM itself has spent over 10 years building its own network.

Messaging Services

Electronic messaging has been available for several years, but has until recently been something of a service solution looking for a market. Implemented primarily to meet the needs of intraorganisational communications, the

Exhibit 2

Western European Network Services Market 1990-1995 Sector Comparison



market has grown only moderately, fostered by the availability of MNS as promoted by the independent vendors. The situation is likely to change dramatically over the forecast period.

The globalisation of business, the emergence of EDI and greater ability to interconnect services are changes that will result in an increasing use of electronic mail services. Information transmitted that is associated with EDI transactions, such as delivery schedule inquiries, is regarded as electronic messaging. This type of control information is vital to the successful day-to-day management of data being processed by EDI communities.

The forecast for the electronic messaging market is robust for the simple reason that increased capability to interconnect disparate systems using X.400 will result in a rapid globalisation of the market. It may well be that the 42% CAGR predicted by INPUT for the forecast period will turn out to have been conservative!

The Strategic Challenge of Positioning

Much of the projected growth for network applications will come from the increased role of the network operators (the PTTs) in the network services market. Many network operators currently offer packet-switching services and are expanding their service portfolios by implementing intelligent network offerings that enable them to customise services more precisely. This new competition presents a considerable challenge to the established independent vendors.

Faced with new competition and the loss of processing services contracts, these established vendors are investing heavily in developing applications and services. As a result, vendor consolidation is likely, with only brand leaders retaining their market positions.

Squeezed between these two groups lie the IT equipment vendors led by IBM. This group of vendors has traditionally acted as supplier to the PTTs and to large organisations with private networks, including the independent third-party network services vendors. The current market positioning of the three competitive groups is illustrated in Exhibit 3.

The future strategies for all three must lie in managing the trade-off between consolidating their current positions and in expanding their offerings into more comprehensive service catalogues:

- PTTs can seek bilateral alliances to increase their global reach.
- Network service providers can move from generic service provision into more vertical applications marketed within national contexts.
- Equipment vendors could build on their tied communities of suppliers and customers to provide combined EDI and messaging applications serving the national markets of Western Europe.

An example of two companies facing the need to establish the correct trade-off is afforded by the recent discussions between British Telecom (BT) and IBM:

- BT seeks to extend its MNS and messaging capabilities to a more global scale by running IBM's internal network.
- IBM seeks access to BT's user base in voice-related sectors in order to sell its equipment and services, and to build a salient into the integrated network sector in preparation for expansion in this area.

The running of such a joint partnership with the correct degree of formality or informality is the key to its success.

Conclusion

The outlook is particularly bright for vendors that can merge their rapidly evolving network capabilities into a global communications structure and can manage the marketing of timely information services within that structure. If any single trend stands out, it is the rapid growth of the world network infrastructure during the forecast period. This environmental upgrade will stimulate the demand for information. Communications-orientated services, functions and capabilities are certain to follow.

Finally, one very important outcome of the evolution of intelligent networks will be the development of virtual private networks (VPNs). These are advanced, end-to-end digital networks, fully tailored to the requirements of their users but owned, managed, maintained and operated by public network operators or third-party suppliers. VPNs will be a new stage in network-based communications, narrowing the gap between public and private networking. Though not offering dedicated communications, VPNs will relieve users of complex and expensive day-to-day network management, and of the need to update their equipment whenever technology changes. Thus, the aim of the VPN is to offer a flexible, user-friendly mixture of private network security with the ubiquitous access and economies of scale of a public network.

Exhibit 3

Current Competitive Positioning

	National	International
Application Services		
Messaging Services		Network Services Providers
Managed Network Services	PTTs	Equipment Vendors
Basic Transport		

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About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software, processing services, turnkey systems, systems integration, professional services, communications, and systems/software maintenance and support).

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialisation. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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Comprehensive and Coherent Network Services—The Vendor Opportunity

User network requirements are becoming increasingly complex as commercial pressures and technological change alter their priorities. This presents vendors with a considerable opportunity to offer comprehensive and coherent network service solutions developed from close tracking of changing user needs.

Two factors stand out from the mass of detail that is continually coming to light from INPUT's ongoing research programme:

- The network is increasingly seen by users as the corporate information system, the platform that delivers their key application requirements. The growth of local-area networks (LANs) is a prime driving force in this changing equation, as end users increasingly lose their sense of stand-alone PC isolation and as the local network becomes a greater part of the office system.
- There is a distinct dichotomy between the application systems requirement and the information infrastructure requirement in their responses to changing business needs.
- Application systems are required to be dynamic in their response to business. Systems should change in response to

changing business needs—becoming more decentralised or not, acquiring further functionality or dropping functionality as necessary, becoming more integrated or more modular as the case may be, merging with systems from acquired companies, and exchanging information with business partners.

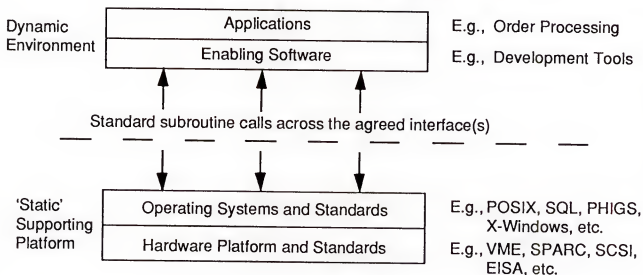
- The information infrastructure, on the other hand, is required to be as static as possible in order to present a stable platform upon which to build systems. Corporate network infrastructures work, therefore, with a typically much longer life cycle than the business requirements they are designed to support.

During the 1980s the evolution of industry standards throughout the data processing industry has tried to address this problem by separating the system platform from the applications superstructure along a set of well defined "planes" at the operating software level. Exhibit 1 illustrates the principle of providing firm industry-wide platform interfaces.

The difficulty of achieving the required level of harmonisation and standardisation is demonstrated by:

Exhibit 1

Uncoupling Applications from Infrastructure



- The industry's increasing preoccupation with open operating systems interfaces such as those UNIX (in its many variations) presents.
- The drive to improve application programmer productivity by providing better tools and better management.

The introduction of the networking dimension adds another layer of complexity to this situation:

- Networking offers a whole range of opportunities for locating or relocating business functions.
- Networking offers possibilities—some short-term, some long-term—of integrating transmission across the

different types of information: i.e., data and voice, data with image, or all three, opening the way for cost saving and for new applications.

- Lastly and most significantly, the application of digital technology to networking puts the infrastructure into a state of constant change.

To counter this adverse effect, one company that INPUT recently interviewed in its network services programme has structured itself so as to use a commercial buffer between the infrastructure, which is evolving under the impetus of new technology, and the applications, which are constantly being modified and revamped to support the business needs.

Exhibit 2

Buffering Applications from Infrastructure Changes by Means of a Managed Network Service

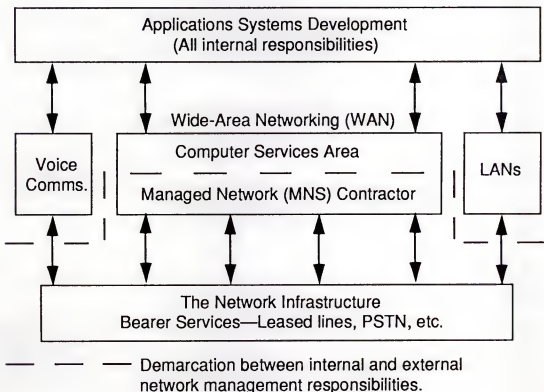


Exhibit 2 shows how the use of a managed data network provider, coupled with an internal organisational split between the application development teams and the operations side, helps to insulate the task of fulfilling business needs from the externally provided networking infrastructure. The focus of this commercial arrangement is in the area of wide-area networking between the company's headquarters and its national branches in the U.K. There is, however, no reason why the principle should not be applied across larger or smaller geographic areas. Other areas of networking do not present the same difficulties:

- Voice applications are standard and are managed in-house, although some integration is necessary to handle

transmission between head office sites most economically.

- Local-area networking is still all on-site and judged to be manageable in-house.

A greater degree of integration of these functions with the main data processing applications can be expected in the medium-term. This integration will increase or rather widen the need for the type of buffering the MNS (managed network service) currently provides.

INPUT sees this type of solution as being most applicable to companies with the following characteristics:

- A need to support on-line branch networks with more than 25 branches.
- Operating in service industries in which new products need to be introduced speedily and regularly.
- Fast-growing and, therefore, likely to be opening new branches.
- Not large enough to support a large team of networking specialists, and, therefore, unable to offer them an adequate career structure.
- Employing IS management whose skills are in areas other than networking.

INPUT's 1991 research programme examines the requirements of larger organisations that can justify a substantial in-house network team, as well as smaller organisations where multisite operations are increasing but are less significant to the business. These user issues are analysed and reported on in INPUT's 1991 report: *Western European User Issues in Network Services, 1991-1996*.

This research bulletin addresses the needs of vendors to understand these important trends in order to be able to deliver the necessary comprehensive and coherent network solutions of the 1990s.

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The Basic Network and ISDN— The Challenge of a New Infrastructure

The world's business community has become used to the presence of a basic global voice network—the telephone network or PSTN (Public Switched Telephone Network). Although less developed countries in the world can sometimes only be reached by the older digital telegraph technology of Telex (the only other truly global switched network), most business people (and households too) have come to regard the PSTN as a fact of life. Commercial life would be unthinkable without the immediate person-to-person interconnection PSTN's existence facilitates.

For the first 20 years after computer communications were conceived, the PSTN was also used as a major carrier vehicle for many data communications. Because of its basic deficiencies as a medium for nonvoice communications, however, technologies—both hardware and software based—have emerged to offer the data communications user a better set of tools:

- Leased lines dedicated to individual customers have grown in number and usage so that they now account for over a third of PTO revenues worldwide.
- Digital signalling has been introduced to replace the obsolescent analogue techniques. It is now available on leased lines and in the trunking links of all major public switched networks. Digital

switches are the standard for modern public network exchanges.

- Specific signalling and switching products—e.g., X.25—have emerged to cater for the particular needs of the data communications user.

The growth of computer-based communications has consequently had two key results for the evolution of the PSTN:

- On the one hand, the data communications user community has migrated away from the PSTN as the mainstream network for data—either into leased-line private networks or onto specialised public data networks (PDNs) or into a combination of these two solutions (the hybrid network solution, as it is known).
- On the other hand, the viability and efficiency of the PSTN have undergone steady but slow improvement—though not enough to allow it to break out of its main role as the carrier of basic person-to-person voice communications.

In the mid 1970s the CCITT (Comité Consultatif International des Télégraphes et Téléphones; the world body responsible for international wired telecommunications) conceived the idea of a new global switched network provided by the PTOs in the same manner as the

PSTN. The new network was to be designed to overcome the limitations of the existing voice network. This new network concept was given the name ISDN—Integrated Services Digital Network.

Since that time ISDN has advanced slowly towards its goals:

- To provide a worldwide public network capable of handling all information media equally well—voice, text, data and image—in an integrated bandwidth pipe
- To provide a network capable of eventually replacing the existing PSTN
- To do all this in such a manner as to allow for easy migration of applications to the new network
- To price the new network in an equivalent (though not necessarily

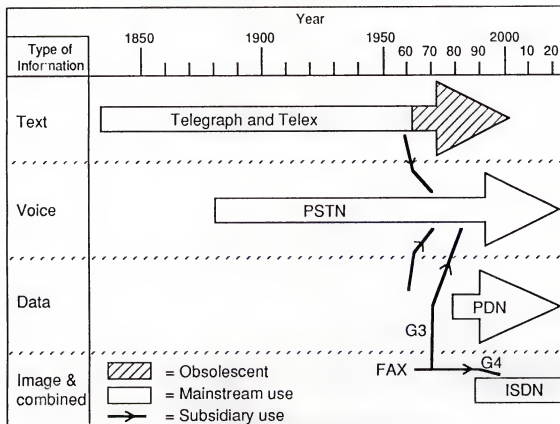
completely equal) way to the PSTN charging mechanism—i.e., with an exchange line installation cost and a call cost dependent on zoned distance

Exhibit 1 shows the development over time of the global networks operated by the PTOs. Besides the global telex and PSTN, national public data networks have evolved mainly based on the CCITT's X.25 protocol. These data networks are not operated as one single network, although internetworking is available through special protocols and services.

Exhibit 2 summarises the features that have emerged through the many thousands of person-hours expended by the committees of the standards-making bodies during the past 15 years. Important features to note are:

Exhibit 1

Evolution of Public Global Networks



Source: INPUT

- ISDN has, as a concept, already spawned a further stage of development beyond its initial implementation. This is known as broadband ISDN or B-ISDN for short.
- Current implementations of ISDN are thus known now as narrowband ISDN and are based on the key quantum of signalling spectrum set at 64 kbps.
- Two levels of service have been defined for narrowband ISDN:
 - Basic Rate service (known in acronym form as 2B+D) provides 2 x basic transmission or bearer channels (the Bs) which each offer 64 kbps speed and 1 x data signalling channels (the D) operating at 16 kbps. The D channel, for example, can support packet switching and is expected to be useful for small-volume on-line applications, such as credit card authorisation or low-speed telemetry.
 - Primary Rate service (known as 30 B+D) provides more channels—this time 30 x/64 kbps transmission channels and 1 x/16 kbps data signalling channel.
- The major problem with the introduction of ISDN is similar to that of "the chicken and the egg":
 - ISDN needs intelligent or 'smart' network applications to justify its investment to the infrastructure supplier and user alike.
 - Users need vendors to have supplied the infrastructure before they embark on ISDN applications, while vendors need to be assured of user demand before making the infrastructure changes needed.
 - The market is thus caught between the three-pronged requirement of the user, the vendor and the software applications.

Exhibit 2

Key Market Features

- ISDN is an advanced Public Switched Network
- Not just for voice, but for data, image, text, video and any combination
- Current commercial offerings are narrowband:
 - Basic rate (2B + D) - 1B = 64 kbps
 - Primary rate (30B + D) - 1D = 16 kbps
- Principal European coverage:
 - France (NUMERIS is the ISDN (or RNIS) network)
 - Germany
 - U.K. (ISDN2)
- Requires "smart" applications—e.g., cross media
- Key strength: same usage charge structure as the PSTN

Source: INPUT

Exhibit 3 lists the main drivers and inhibitors affecting the narrowband ISDN market. INPUT believes that the main supporters of the technology have seriously underestimated the marketing effort required to launch ISDN services.

The major country PTOs in Europe have made serious commitments to the eventual full implementation of ISDN services, but with the exception of France, where the Basic Rate NUMERIS network has almost complete national coverage, and the U.K., with the ISDN2 service, the implementation is patchy in geographic terms, being

Exhibit 3

Key Market Forces

Drivers	Inhibitors
Need for voice/data integration	Complete range of new standards to be agreed upon
CEPT, EEC, CCITT & ISO backing	Coverage uneven
Migration strategy in-built	Gaps in tariffing
Levels of service	Technical talk
Narrowband - basic rate access	Hype
- primary rate	Alternative in-house solutions
Broadband	
Simplicity	

Source: INPUT

confined to areas where demand is estimated to be highest:

- The U.K. is on a second-generation service—ISDN 2 and ISDN 30—but its features have not yet enticed many business users to enter the ISDN camp.
- Germany has limited coverage around major conurbations and cities, but appears more interested in MANs (metropolitan-area networks) and wide-area packet switching. Thus the leadership in B-ISDN coverage is a clear target for DBP Telekom.
- Other countries in Europe—e.g., the Netherlands and Italy—have prepared useful ISDN programmes.
- The EEC sees ISDN as a key strategic application enabler and is actively encouraging ISDN take-up as part of its ONP (Open Network Provision) programme.

In Exhibit 4 INPUT compares the main characteristics of ISDN and of the PSTN it replaces. The key feature is that ISDN provides for end-to-end (or desktop-to-desktop) digital characteristics.

Applications that can benefit from ISDN are:

- Digital backup for leased lines to ensure that no session service breaks occur
- Interconnection of local-area networks for file transfer when the volume of traffic is low to medium-low
- Applications requiring calling number identification (CNI) such as Automatic Call Distribution (ACD) and similar sales- and telemarketing-orientated applications
- Teleconferencing involving data, voice and video
- Group 4 fax (a popular application of ISDN in Japan)
- ISDN can also act as a messaging and EDI enabling technology, particularly useful to smaller businesses in which partial computerisation causes a need for conversion from one medium to another (e.g., from EDIFACT coded messages into fax, or into voice for voice-message archiving of EDI transmissions)

Exhibit 4

Comparison of Main Network Features

ISDN - Narrowband	PSTN
Digital to the desktop	Analogue user interface
Standard 64 kbps or multiples/submultiples	Voice-grade circuits up to 19.2 kbps maximum
Circuit-switched or packet-switched	Essentially circuit-switched
Designed for multiple media	Designed for voice
Growing coverage	"Universal" coverage
Needs to be here	Needs to be superseded

Source: INPUT

- Low-speed telemetry and surveillance applications
- ATM networks

Benefits that accrue to the user of ISDN are:

- Quicker call connection and set up
- Cleaner lines end-to-end, even for straightforward voice communication, since ISDN implies digital lines end-to-end
- Savings in PABX hardware through the elimination of analogue circuitry. One supplier estimates this saving could eventually be as high as 30%
- A single intra-building wiring system for all types of connection, hence savings in wiring costs and building space
- International internetwork switching
- Improved administration and billing in the public network

Drawbacks to the use of ISDN and delays in offering services have dragged out its implementation over 15 years—since the

mid 1970s. Extensive usage is still being postponed (by the forecasts of industry specialists) well into the mid- and even late 1990s. Areas of difficulty are:

- Coverage by PTOs is restricted initially to the geographic areas in which they estimate take-up will be most rapid and, therefore, most profitable.
- Different national interpretations of the CCITT and ISO standards have emerged as some PTOs have raced to pre-empt the standards-making exercise by de facto on-the-ground services.
- Different levels of service are priced differently in each country implementation.
- ISDN features are required by the market-place, but not all users are willing to wait for standards and tariffs to be laid down. Hence, competitive in-house solutions have inevitably evolved and are now being implemented instead of ISDN.
- The development of higher bandwidth transmission and switching standards under the broadband ISDN (or B-ISDN) label has caused some users to plan for

the later broadband technology, relegating narrowband ISDN to the level of a technological cul de sac.

INPUT believes that the main goal of the ISDN initiative (to provide end-to-end digital networking for all subscribers) is a commendable goal and will be eventually implemented through a combination of routes and via an uneven patchwork of intermediate services. The opportunity to offer the facilities of ISDN to small business and even single-line subscribers will be one of the last objectives to be satisfied. In the meantime, other technologies and non-ISDN standards will be of interest to the corporate network managers, with public ISDN of minor influence only, but with this influence increasing as ISDN coverage becomes significant.

The types of service offered to users during the continuing period of growth of the ISDN network will depend on the background of the supplier:

- PTOs involved in ISDN implementation should market to telecommunications managers and to their end users a range of professional services products aimed at establishing ISDN migration strategies, e.g., consulting on and designing individual ISDN network applications, assisting users in the design of ISDN application programming interfaces (APIs), furthering application possibilities and market awareness by education and training products, and promoting the development of standard APIs as part of their standard setting work.
- Network and computing equipment suppliers should be developing specific software solutions for ISDN applications and using alliances and joint ventures with software product suppliers and software publishers. In this way

suppliers will be able to market total solutions to a wide range of existing and potential users.

- The independent network service (or VANS) providers have the ability to offer ISDN-like facilities ahead of the PTOs through judicious use of emerging technologies to provide customised VPNs (virtual private networks) and interconnection between these and other technologies. VANS providers will be presented with a range of market opportunities to assist users in migration between one generation of network and another. These migration facilities should include:

- Testing of new networks
- Network management during user transition periods
- Alliances with PTOs to assist in coverage of areas in which ISDN is not yet available
- Education and training products for ISDN applications
- Professional services to back up the other products
- Professional services and FM (facilities management) vendors will have greatest flexibility in being able to offer ISDN and non-ISDN solutions to corporate users and end users. They will be able to address the transition and migration requirements of users who know what type of solution they require. They are also in a position to offer total solutions to users who look to an outsourcing supplier to take over the technical and operating problems in their entirety.

All vendors must start to see ISDN in terms of applications and solutions, instead of marketing the benefits purely from the technical angle.

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A Publication from INPUT's Network Services Programme—Europe

The Impact of New Trunking Technologies on Network Services and Applications

The Technologies

ISDN was conceived within the CCITT to allow users to gain access to the new and improved digital services of the future. The implementation of this design was to be achieved through the establishment of a set of standards covering the user access interface to these services. The services would then be able to evolve behind the agreed access interface.

Inevitably the implementation could not be achieved as harmoniously as the original designers might have wished. Agreement on standards is difficult to achieve, and while disagreement lasts, local variants flourish.

However, apart from the access standards issues, there has been an added stimulus for the development of the trunking technologies that were needed to handle ISDN-type services—whether on public or private leased-line networks. Two types of developments have been taking place, with a number of important objectives:

- To allow much higher speed transmissions on terrestrial links—i.e., at least up to 600 Mbps and even up to 2.5 Gbps using fibre optic cable

- To handle high-volume data in bursts (such as occurs during data file transfers) as easily as delay-sensitive data (such as occurs in digital voice communication)
- To improve bandwidth utilisation, bearing in mind that as much as 60% of a normal voice conversation is in fact silence and that the equivalent figure for data communications can be as high as 90%

The two development areas can be classified into

- Developments in transmission links that are hardware based—such as the use of microwave line-of-sight techniques, satellite links, and increased submarine cable capacity across transatlantic and other transoceanic routes where fibre optic technology is now replacing coaxial cable and thus lowering cable and repeater costs
- Developments in protocols and switching techniques that are initially software based but may later come to be re-implemented in silicon once the algorithms have been established as robust enough to warrant the increased speed, cost and risk involved in going into firmware or hardware

Exhibit 1 lists some of the characteristics of the current market-place that result from the impact of these technology improvements.

The area of greatest confusion is switching technology. Because this technology impacts both public and private networks, it is of concern to all market players. Most development is in the direction of fast packet switching, a term that, because it is used loosely, can be one of the causes of confusion.

INPUT sees a technological convergence between two hitherto opposing techniques:

- Circuit-switching, particularly TDM (time division multiplexing), which has evolved for voice and has later been used widely for backbone networking in

integrated voice and data networks in the private network sector

- Packet-switching (now largely centred on the X.25 protocol), which is the CCITT standard for public data networks (PDNs) provided by the PTOs and for large-scale data networks in the private sector

This convergence is caused by the need to find a trunking protocol that (for the integrated networks of the future) combines the advantages of circuit and packet switching while avoiding their individual disadvantages.

The term *fast packet switching* is being confused with the terms *frame relay* and *cell relay*, which are essentially switching architectures—i.e., they define the layout

Exhibit 1

Impact of New Trunking Technologies on Corporate and Public Networks

Market Characteristics

- Confusion between technologies—caused by developments/interactions at different levels of the OSI model
- Traditional vendor boundaries breaking down—WAN to LAN and vice versa—PABX to data transport
- LAN/MAN/WAN boundaries breaking down—e.g., FDDI can cover up to a 200 km area
- Migration strategies important
- Support for “hybrid” (private/public) networking
- Improved error performance—digital circuits

Source: INPUT

of transmission formats. The switching technique defines how the formats are processed by the switches in the network nodes.

Exhibit 2 compares the basic features of the three switching techniques. Fast packet switching differs from traditional packet switching in a number of ways.

- All packets relating to one session or message are routed on the same route—the virtual circuit principle.
- Switching is simplified (and thus the delay in each node is minimised) by reducing it to a simple decision to pass the packet (or frame) to the next node in the circuit or to prepare it for output from the network at or via the current node/switch.

- Error correction is undertaken at the end points of the circuit by the higher level protocols.

This simple switching technique has led to the use of the term *relay*—i.e., pass the packet on or finish with it.

- In the frame relay architecture, packets (or frames) are of variable length and the relay technique can be performed by software.
- In the cell relay architecture, packets (or cells) are short and of fixed length (48 bytes is the proposed standard). In this case, the switching can be performed through firmware-based, special-purpose hardware with a resulting increase in transmission speed.

Exhibit 2

Comparison of Switching Techniques

Features	Circuit Switching	Packet Switching	Fast Packet Switching
Main Application Area	Voice	Data	Voice, data or image
Bandwidth Utilisation	Medium	Low-medium	High
Speed Range (Per Channel)	Up to 2 mbps	300-64 kbps (or 1,000 packets per sec.)	100,000 packets per sec. (or up to 600 Mbps)
Channel/Port Use	Dedicated	Shared	Shared
Users	Private networks, some public services (e.g., Transfix, Datex-L)	Private data networks, VANS, IVANS, PDNs (e.g., PSS)	VANS, IVANS, some private networks (U.S.)

Source: INPUT

Cell relay systems are still in the development stage, but are expected to achieve throughput speeds of up to 1 million packets per second, due to the low delay overheads in the switches. Frame relay systems are now being installed in certain large user firms in the U.S. as well as by the independent VANS suppliers and certain PTOs. Frame relay bridges the gap in the throughput spectrum between packet speeds of 1,000 per second up to the lower threshold set for future cell relay systems at 100,000 packets per second. It is an intermediate technology designed to improve network throughput until ISDN trunking standards are fully established. As such, some proprietary frame relay standards are

evolving to fulfil immediate user requirements.

Of primary importance to the implementation of any fast packet switching is the superior reliability of the all-digital circuitry in modern networks. Without the low error rates of digital circuits, the strategy of postponing error correction to the higher level protocols operating at the end points would be untenable, and this postponement is vital to achieving the low switching delays.

Exhibit 3 summarises the main performance parameters of the three packet architectures:

Exhibit 3

Comparison of Packet Switching Architectures

Features	Architecture		
	X.25	Frame Relay	Cell Relay
Packet Length	Variable (up to 128 bytes standard)	Variable (up to 4k bytes standard)	Fixed at 48 bytes
OSI Layers	Levels 1 to 3	Levels 1 & 2	Levels 1 & 2
Error Correction	Done by X.25	Done by higher level of protocols	
Protocol Handled by:	Software	Software	Hardware
Circuit Type	Analogue or digital	Digital	Digital
Traffic	Data or text	Voice, data or text	Voice, data, text or image
Users	Private data users, VANS & PDNs	VANS, ISDN, some private users	ISDN, PSTN

Source: INPUT

- X.25
- Frame relay
- Cell relay

Exhibit 4 compares ISDN—narrowband with frame relay, highlighting the key differences.

Market Impact

The significance of new technology in the switching area differs for users and vendors:

- For users, there will be a number of solutions evolving at different levels in their network structures over the course of the current five-year forecast period, and to the end of the century. These changes will occur in the public networks principally, but they will also offer possibilities for private network builders. The changes will, therefore, affect the trade-offs between private leased-line costs and use of the public switched services. This make-or-buy decision is going to become more difficult and

riskier. The attraction of an external managed network service or the use of one of the new breed of virtual private networks (VPNs) is forecast to grow, as a counter-measure to the increasing risks involved in running a private or hybrid network.

- For vendors, the market impact of new technologies will be a function of vendor type.
- PTOs are being forced to upgrade their technologies to cope with the ongoing traffic increase. If voice and data traffic continue to rise at the current rates of 5% per year and 20% per year, respectively, data (and the new image processing applications) will require the same amount of bandwidth as voice applications at some time in the second half of the decade. Currently voice accounts for between 70% and 90% of traffic, depending upon which country is under discussion.

Exhibit 4

Comparison of ISDN and Frame Relay

ISDN - Narrowband	Frame Relay
Essentially a switched network	Essentially a transmission technology
Suitable for large, medium-sized and small users	Useful for private and public networks
Intermediate to B-ISDN	Intermediate to Cell Relay
Could supersede the PSTN	Supersedes X.25 & TDM
Impacts switching, user interfaces and cabling	Impacts switching and error correction

Source: INPUT

- VANS providers must upgrade their networks to be able to compete with the PTOs in the areas of managed services and network applications. GEIS has already announced its intention to install Stratacom frame relay switches progressively into its network and to mount services that allow users to be migrated onto this more competitive infrastructure while retaining compatibility with X.25 and SNA protocols.
- Network equipment vendors, such as Alcatel and Northern Telecom, will need to be actively involved in funding investment of the new hardware and software required to implement the technologies. Profitability will be key to the ability to keep up with market demands.
- Computer equipment vendors are liable to be bypassed by the new technology developments because these developments are not directly affecting their current business areas. Their users, however, will be anxious to acquire better technology to solve the increasing LAN interconnection problem. There is an opportunity for computer vendors to establish alliances with smaller specialist equipment vendors in order to stay close to this fast-changing business.
- Independent systems integrators and professional services companies and consultancies will be offered a range of opportunities, including:
 - Consultancy assignments to assist in assessing technology impact
 - Implementation of hybrid solutions
 - Advisory work on the take-up of new technologies and new products
- Software product vendors will receive opportunities to develop ISDN applications and ISDN access module utilities. In the first instance, they should work closely with, and market their product potential to, the network and computer equipment vendors.

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Research Bulletin

A Publication from INPUT's Network Services Programme—Europe

The Impact of Satellite Technology on Network Services

The markets supported by satellite-based technologies have been changing over the last few years.

- The principal market focus of satellite services for the commercial user has been to provide an alternative long-haul transmission technology to ground-based services; satellite services are particularly suitable because of their apparently limitless capacity for transoceanic communications, where they rival submarine cable systems. This market thrust, which fuelled the initial growth of satellite services, gave ground to other application areas under the twin impacts of:
 - A levelling off of satellite channel costs in the mid-1980s following the steep fall in costs between the years 1970 and 1981.
 - The need to find other markets to counter the loss of market share to optical fibre technology, which came to market 10 years after satellite technology, in the early 1980s.

- The new market thrust for satellite technology gathered strength during the late 1980s due to further technological developments in the earth segment, notably very small aperture terminals (VSATs), which opened the way to the incorporation of satellite links into private network structures.

Exhibit 1 lists the main applications for satellites in civil applications, and segments them by chronological generation. The areas of most importance for new services are associated with vehicle location, and store and forward messaging for mobiles. These new opportunities are, of course, promoted by the increasing use of mobile communications and the less-than-satisfactory service provided for data transmission to and from mobiles by existing land-based techniques. The data and video broadcasting application for private and public sector organisations is an extrapolation from TV broadcasting in the entertainment market.

Second-generation applications such as basic telecommunications transport and TV emissions remain the most important users of satellite transponder time, accounting for 65% and 25% of usage, respectively.

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Exhibit 1

Satellite Applications for Business

Application Area	Generation of System
• Navigation/rescue of ships/aircraft	1st
• Remote sensing—meteorology, agricultural, etc.	2nd
• Basic telecommunications transport: <ul style="list-style-type: none"> - Short messages, telex - Low-speed data transmission - Telephony, fax and TV - High-speed data transmission 	
• Location of terrestrial mobiles	3rd
• Combinations of location and messaging for different types of vehicle—land/sea/air	
• Private network data and video broadcasting	

Source: INPUT

Exhibit 2 lists some of the major satellite services available in Western Europe. The principal applications for satellites can be gauged from the chart:

- Two satellites are supplied by world-wide telecommunications operators and have systems with worldwide accessibility.
- Two more are dedicated to TV for entertainment purposes.
- Four satellites are mainly European, and all four will soon launch vehicle location applications. These are the ones looking for the new user base.

These new application areas operate at the network applications level of INPUT's network services market model and necessitate new services combining generic applications, like store-and-forward messaging, with industry-specific features marketed commercially, internationally and in conjunction with industry and trade associations. In the past, satellite applications have in the main been at the bearer service or enhanced services levels. Satellite, therefore, is a new technology that traditional network services vendors need to know and use, where appropriate. Currently, except for the PTOs, the

Exhibit 2

Western European Satellite Services

Satellite	Main Shareholders	Services	No. of Satellites	Comments
EUTELSAT	28 European PTOs	Euteltracs	1	Service launch: 1/7/91 Application: vehicle location and messaging
LOCSTAR	British Aerospace Daimler Benz, MAN, Matra, Thomson-CSF	-	1	Service launch: 1/9/92 Application: as for Euteltracs (Project now on hold at 1/7/91)
PRODAT	ESA	-	0	Looking at transportation applications
INMARSAT	International ownership	Ship-to-ship and ship-to-shore	Now on -B	Traditional voice and messaging Ambitions: terrestrial
INTELSAT	International	Long-haul transmission	Now on no. VI	Principal provider of trans-oceanic links
KOPERNIKUS	DBP Telekom	DAVID DIVA Bearer services, especially East-West	2	BAeCom lease transponders VSATs for overseas and domestic links
ASTRA	SES owned by institutions	TV broadcasting	2	25 million homes in Europe served 2 more satellites planned by 1994
BSB	BSkyB	TV broadcasting	1	Merger of Sky and BSB Problematic future

Source: INPUT

majority of new market entrants are new to the network services sector.

Terrestrial data broadcasting can cover some of the same applications, namely:

- Private network data transmission at competitive rates
- Broadcast VPNs (Virtual Private Networks)
- News gathering and distribution
- Consumer applications such as bulletin boards and software distribution

Satellite, however, is more suitable for the higher bandwidth applications.

The leading industry sectors requiring satellite and terrestrial broadcasting and two-way data transmission are:

- Financial services, especially for dealing applications
- Automobile, with dealer and distributor communications the main requirement
- Travel and tourism, where reservation systems require significant bandwidth

During the 1990s, the new roles of satellite technology will become more important because users will need sources of bandwidth other than those provided by the ground-based network operators. These services will evolve in spite of the expected regulatory obstructions coming from the PTOs.

Satellite and broadcast data offer services that are complementary to ground-based services in a number of areas:

- Back-up and resilience to the ground networks
- Ability to install networks speedily in what were previously the Eastern Bloc countries
- As a component of the growing portfolio of mobile communications services

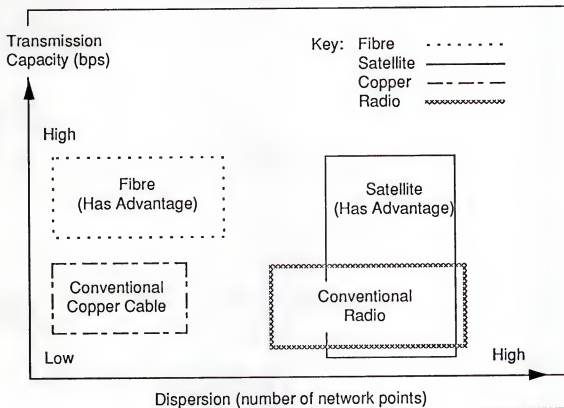
Exhibit 3 positions the four main transmission technologies according to their ability to serve dispersed fixed/mobile sites and their transmission capacities.

The major challenges for vendors in the satellite sector are:

- The growing importance of Direct Broadcast by Satellite (DBS) as the dominant application
- The waning importance of long-haul basic transport, although it remains the single largest application. Overcapacity on transatlantic and other transoceanic cable systems will impact satellite channel pricing.
- The extended length of the distribution chains, both physical and commercial
- The two sets of regulatory bodies involved—for radio (in the space segment) and wired communications (in the earth segment)

Exhibit 3

Service Positioning Chart for the Principal Telecommunications Technologies



About INPUT

INPUT provides planning information, analysis, and recommendations for the information technology industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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Research Bulletin

A Publication from INPUT's Network Services Programme—Europe

The Impact of Mobile Communications

Introduction

Mobile communications is one of the fastest growing sectors of the telecommunications industry. The last decade has seen the introduction of a number of new services; most important of these is the cellular network systems that have been successful in the U.K., Scandinavia and to a lesser extent in Italy, France and Germany.

Most recently there has been a second wave of new developments:

- The specification and imminent launch of the pan-European cellular service (GSM)
- The ERMES pan-European paging project
- Second-generation cordless (CT2) phones and Telepoint services
- A specification for a European cordless system (DECT)
- The award of licences to would-be operators of PCNs (Personal Communications Networks) in the U.K.

- Contracts for business networks using VSAT (Very Small Aperture Terminals) satellite systems in Germany

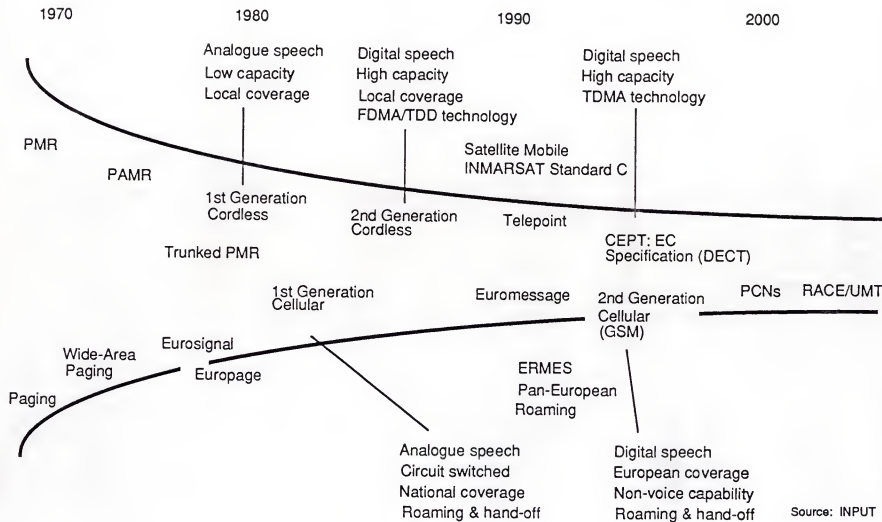
The focus for setting standards is increasingly shifting to Europe to take into account the importance of international perspectives in data communications and telecommunications, and the increasing dependence of the business community on reliable and efficient telecommunications networks. This implies considerable co-operation at the supranational level regarding not only the harmonisation of product standards, but also the interworking of networks and the allocation of frequency spectrum for multiple mobile services.

There is no doubt that cordless telephony will ultimately lead to the development of the personal portable communicator. What is in doubt is the precise evolutionary path for this development.

Exhibit 1 illustrates the likely evolution and convergence of mobile communications systems up to the end of this century.

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Evolution of Mobile Communications



Mobile Service Products of the Future

In general, any mobile communications service (voice, data or a combination) fits within an increasingly complex web of communications services that includes:

- Cordless
- Cellular
- Public mobile radio/band III
- Public access mobile radio (PAMR) networks
- Satellite
- Paging services
- Payphones
- Voice messaging

These services revolve around use of either the existing fixed network (wire and optical fibre) or radio frequencies, or any combination of the two.

The process of innovation has led to an overlap of competing services that address particular market requirements. These services have evolved differently, allowing more application functionality to be built into systems and services.

The situation in the U.K. is different from that in the rest of Europe, where the continuance of an uncoordinated policy regarding frequency allocation and product standards has severely impeded the growth of mobile services. However, initiatives are under way to rectify this.

Second-generation paging, cellular and cordless telephony products and related services create a new array of application areas, primarily due to the performance improvements achieved by the use of digital technology:

- En route communication with better signal quality than analogue systems
- In conjunction with the public Telepoint service, business users can combine on-site mobility with the occasional need for off-site PSTN connection.
- Wireless PABX environments to allow mobility within the office environment
- The possibility of complementary facilities among cordless telephony, paging and voice messaging with eventual integration to allow for 2-way communication

In the business environment, the technology offers a new form of personal access to a whole range of potential information services based on either voice-activated and voice-coded output, or to traditional data services via simple telephone key-pads or in conjunction with mobile notebook-size terminals and fax machines.

Two-way messaging services, based on hand-held data terminals incorporating backlit LCD character displays, are already being announced in the U.K.—notably the service being prepared for an autumn 1991 launch by the Cambridge-based company, Cognito.

It is argued that cellular system pagers and cordless telephony will converge into personal communications. It is generally thought that the Telepoint concept will not

pose any significant challenge to cellular. However, alphanumeric paging systems and specialist two-way mobile data services (with store-and-forward capability) will. INPUT foresees the integration of corporate mobile facilities within in-house networks as an increasing priority for the telecommunications manager, as mobile data capture units turn from batch to on-line working. Racal Vodafone's network in the U.K. already offers corporate IS managers the opportunity to take a digital feed from the Vodafone network for voice or data. Exhibit 2 lists the key features of the impact of convergence between fixed and mobile communications.

Exhibit 2

Key Aspects in Mobile Communications

- Convergence of mobile with fixed link applications
- Development stages
 - Separate private networks: go public
 - Interconnection to PSTN
 - Additional access mechanisms:
 - Telepoint, paging, mobile terminal
 - PCN—interconnection to ISDN
- Voice input/output developments

Source: INPUT

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Research Bulletin

A Publication from INPUT's Network Services Programme—Europe

Developments in Cordless Telephony

Introduction

Cordless telephony (CT) is one of the most recent of the developments in mobile communications, and Telepoint services (discussed in more detail in Section 3), based on the CT2 version of this technology, have now been launched in Europe. Earlier technology (CT1) used analogue transmission on a preset frequency; CT2 technology, developed over the last decade, uses digital transmission in the 864-868 Mhz range at a power of 100kw.

The initial focus of attention for the designers of CT2 was the potential offered by the business/office market; but for this potential to become reality some form of cordless PBX is required. Attention is now focussed on the domestic/residential market, although in the longer term the business sector will yield more service opportunities.

Telepoint offers the mass market a public mobile personal communication service and a portable handset/instrument. Forecasts by technology consultants encouraged all those working in the field—and particularly the U.K. company, Ferranti—in the belief that considerable potential exists for a public cordless phone system.

In the U.K., licences were initially awarded to consortia consisting of a variety of major firms in the communications field:

- Phonepoint - with BT, STC, NYNEX, France Telecom, and Deutsche Bundespost
- Zonephone - with Ferranti Creditphone on its own
- Callpoint - with Mercury Communications, Shaye, and Motorola
- BYPS - with Barclays, Philips, and Shell

Since the start of the services in late 1989:

- Callpoint and BYPS have announced their intention to merge.
- Hutchison Telecom (U.K.), a cellular radio service provider, will be the vehicle for the acquisition of BYPS by its Hong Kong-based parent, the Hutchison Whampoa group controlled by Mr. Li Ku-Shing. Hutchison also has interests in paging.
- Ferranti has announced that it is abandoning the Zonephone project.
- Telepoint has not yet become a viable service product, having only some 10,000 users in the U.K.

The development of PCNs (personal communications networks) threatens to give added impetus to these developments, if only as a result of the enthusiasm and commitment from the various consortia that at one time before the current recession saw this as a way of generating substantial profits. Unfortunately for these future service providers, the heyday of cellular services growth is now past. A much more competitive climate exists and will exist through the first half of the new decade.

Cellular Evolution

Mobile communications have evolved rapidly since the 1950s. The early days of private mobile radio and paging have given way to a range of products and services that encompass:

- Wide-area paging
- Public access mobile radio
- Short range radio
- Satellite communications
- Cordless telephony in its various forms

It has been recognized for some time that the radio spectrum, particularly in the lower frequencies, was a scarce resource. One way of overcoming this problem was to limit the power of the transmissions so that exactly the same frequency could be reused some distance away. This is the basis for cellular radio: the same radio frequencies can be used many times across an area or region without interference among users.

In Europe, the Scandinavians were the first to take advantage of this market opportunity, launching the Nordic Mobile Telephone (NMT) Service in 1981. This was a fully automatic cellular system and has grown rapidly to become the model for many other countries. Because of their early experience, the Scandinavians have been very successful in exporting their technology, and NMT systems have been established in Spain, Austria, Switzerland,

Belgium and the Netherlands. Ericsson and Nokia have been the two companies able to take commercial advantage of this situation by supplying equipment and services for the infrastructure in these countries.

The systems established in other countries vary. The U.K. and Ireland have imported a U.S. technology called TACS; the German system has been developed by Siemens, that in Italy by Italtel and the system in France by Matra.

In the U.K., the Government licensed two operators, Cellnet and Racal Vodafone, to provide cellular radio services. These became operational in the London area in 1985, and for the first time in the U.K., there was a mobile communications service generally available to the public.

The demand for cellular services has come principally from the business market. Nevertheless the systems are designed to provide coverage of most of a country's surface area and therefore also represent a consumer opportunity.

Since the launch of a national cellular service, progress in the mobile communication field has been rapid both within the U.K. market and within the larger European arena. Over the last few years developments have been gathering pace:

- The development of a pan-European cellular network to an agreed specification drawn up by a European consortium, Groupe Speciale Mobile (GSM). Cellnet was hoping to be the first operator in Europe to launch a digital pan-European service in July 1991 amidst growing doubts that full GSM implementation would be feasible by the self-imposed target date of 31st December 1991. However, the German system will be the first to introduce a service, in late 1991.

- The development of satellite communication. Use of satellites in non-geostationary orbits for mobile communications in moderate latitudes has led to a series of land-based tests of IMMARSAT's Standard-C satellite communications systems. Its relatively low-cost, text-based satellite messaging system currently used by small ships is being adapted to support France Telecom's Euteltracs service, aimed at heavy goods vehicle operators.
- The proposed implementation of the ERMES project, a pan-European paging service with roaming facilities
- The launch of the four-nation (France, Germany, Italy and the U.K.) EUROMESSAGE service, which is a pan-European adjunct to the existing national services, and is designed to fill the gap until ERMES is in place
- The development of a specification for the planned Digital European Cordless Telephone (DECT) standard, separate and distinct from the U.K.'s CAI (Common Air Interface) specification for Telepoint services
- The announcement of the award of three PCN licences in the U.K.
- The launch of services from the U.K.'s Telepoint licencees

Telepoint Service

Telepoint is the generic name given to the public cordless telephone service now being introduced in a number of European countries. Using a CT2 handset, a caller can make outgoing calls via a publicly located base station as long as they are within 100 to 150 metres of it.

The Telepoint base stations are connected to the fixed-wire network in a way similar to any residential station. Telepoint differs from a residential base station in

that it can identify subscribers and, through multiplexing, is able to take more than one call at a time. Billing functions and network management are carried out by each network's operating support systems.

The concept of a mass market public mobile personal communications service is essentially a laboratory development. The Telepoint experiment in the U.K. is the first opportunity to test the technology in commercial terms.

The licences issued by the U.K. authorities contain two clauses of particular interest: the Common Air Interface and Inter-System Roaming:

- **Common Air Interface (CAI).** It was stipulated that from 1991, all handsets would have to operate on all base stations; until then each of the four licencees was allowed to operate its own proprietary system. However, pre-CAI users must be fully supported in the transition to CAI.
- **Inter-System Roaming.** The intention is to allow all Telepoint users to use all public base stations while only subscribing and paying call charges to one operator. This raises questions about the systems to be used and the agreements to be reached between operators on such issues as billing, credit control and user authentication. Consequently, the subject of system management becomes a major issue.

These same problems apply to PCN systems.

The exhibit charts the application areas for cordless and cellular technology, showing the differences between consumer and business usage.

Exhibit 1

Market Segmentation by Application

Mobility Level	Type of User			
	Consumer	Small Business Proprietors	Medium Business Professionals	Large Corporations
Home Base	In the home	Office/home	Office Away from the desk	Away from the desk In the building
On-Site	In the garden	Bar, restaurant Own or customer use	In the building	Factory, plant On-site
On Location	Friend's home Housing estate Block of flats	On the job Checking in	Customer premises On-site	Customer premises On-site, factory, plant
Between Locations	Phoning home Railway station Petrol station Motorways, etc.	Phoning home/base Checking in	Checking in Next call	Checking in Next call
On the Road	On the move Phoning home	On the move Next job	On the move Next call	On the move Next call

Key: CT1 ☐CT2/Telepoint ☐Cellular ☐

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A Publication from INPUT's Network Services Management Programme—Europe

Service Specialisation: The Key To Corporate Network Outsourcing

Introduction

Network managers within major corporations are under opposing pressures both to cut costs and to provide high-performance networking. To fulfill these requirements, organisations are increasingly reviewing the potential for utilising service solutions. Services range from a simple geographic extension of the network through a private service provider to handing over the entire management and control of the network to a third party.

INPUT has recently conducted an in-depth analysis of the network development strategies of a number of major corporations. Those interviewed included organisations that have already chosen a network outsourcing route, and those that are only at the stage of considering the move as part of their potential network development strategy for the future.

The main conclusions of the analysis reveal that despite significant commercial pressures the decision to outsource is not, as would be expected, primarily dependent on cost savings.

The overriding requirements from network planners and telecommunications managers in these organisations are those of service quality and the provision of global networking capabilities. Given the inherent restrictions in Western Europe on extensive geographic

coverage created by PTT controls, global services are more of a desire than a realistic possibility in the short term.

Therefore, the ability of vendors to provide an extremely high quality of service is deemed far preferable to an attempt to provide single-vendor solutions. Users feel that single-vendor solutions cover areas in which the vendor is not a proven expert, thereby threatening the overall quality of service offered. 'One-stop shopping,' despite being one of the major goals and buzzwords of vendors, is not of particular importance to corporate network users.

Vendors should either specialise in niche market service offerings or seek outsourcing candidates with alternative organisational and network requirements to those of the major corporations.

This bulletin gives an overview of the current plans of the corporations analysed in terms of network development and cost-cutting measures. From this the key concerns about outsourcing are raised, which centre largely around the quality of services on offer. Corporate users are in a strong position to make demands on vendors, given the high level of competition in the market. The two most frequently cited demands are global cover and proof of service quality. The current market dictates that both of these are difficult issues for

vendors to address. The characteristics of potentially more promising outsourcing prospects have been suggested.

Current Corporate Network Planning/Positioning

Central to the vast majority of large organisations' concerns is the need to cut the costs of running the network. This is supplemented by the overriding necessity of developing a networking environment that facilitates simple and fast inter- and intra-company communications.

Greater levels of intra-organisational interconnectivity are planned to be achieved in the main through the interconnection of disparate LANs and more open, UNIX-based computing environments.

The main thrust of inter-organisational communications will be through increased use of EDI. This was a confident prediction despite the uncertainty of the telecommunications environment, where network planning is often put on hold pending technological developments and service promises from PTTs and private service providers.

On a different perspective, cost-cutting measures, which are by nature easier for companies to predict, included most predominantly:

- The optimization of the existing network infrastructure, with the main theme being to reduce circuit rental through voice/data integration, voice compression, dynamic bandwidth allocation and investigation of ISDN
- Downsizing of central computing resources

- Reviewing outsourcing benefits, or the renegotiation of tariffs and contracts with currently established service providers

Key Outsourcing Concerns

Faced with a labour market that is short on networking skills and that demands high prices for experts in the field, the decision to outsource is becoming an increasingly attractive option. Corporations, however, have a number of major concerns when considering the decision to outsource network services; these are listed in Exhibit 1.

Exhibit 1

Key User Concerns When Considering Outsourcing

- Network quality and performance
- Tariffs and network flexibility
- Protection of private network investment
- Reluctance to remove in-house management
- Confidentiality

Source: INPUT

There exist enormous vested interests in installed networks, which many network planners are anxious to protect along with their own positions and those of the established network management teams. Outsourcing networks is therefore often an emotional consideration rather than a practical one.

Corporations are primarily concerned with the resilience of the network and achieving the maximum performance standards. For this reason, a great many managers are not prepared to trust their networks to outside vendors. The

main requirement here is proof of successful service, preferably involving a competitor's network, and therefore vendor expertise in the field. Because few users wish to be pioneers of new technologies or services, the difficulty of achieving this for vendors is clear.

Flexibility in terms of tariffing and use and development of the network itself is another key requirement. In a market that is gearing towards open rather than restricted proprietary vendor solutions, the same concerns apply when considering outsourcing of management functions. Tariffing is a particularly difficult issue, given the requirement from users for both set tariffs to enable realistic financial budgeting and a flexible arrangement that does not tie them into bundled services.

Security is another major issue which is frequently raised and must be addressed by potential vendors. This covers two issues: namely, network security in terms of backup in case of circuit failure, and security for the business in terms of confidentiality of information.

User Bargaining Strength

Corporations are currently in a very strong position to make demands of outsourcing vendors, given the changes occurring in the telecommunications market in Western Europe.

A plethora of potential service vendors have been attracted to the market from a wide range of areas in the telecommunications market. This is a result of two main factors:

- The lessening of the PTTs' monopolistic constraints and the resultant increasingly competitive network service environment
- The maturity of the traditional telecommunications product markets, where vendors are now attempting to find alternative revenue streams

The degree of competition and resultant public network tariff decreases, and predicted further decreases, have pushed network service quality to the top of user selection criteria. This

contrasts strongly with the former situation in which availability was more of a key issue.

Additionally, the competitiveness amongst private network product vendors has fuelled a stream of recent technical developments in an attempt to steal market share. This, combined with the development of technologies that are full of promise for the user although still very much on the horizon, such as ATM (Asynchronous Transfer Mode), is facilitating a situation in which users are highly confused by what is on offer and are prepared to sit out the current turbulent market situation.

The strong bargaining position of users means that although in practice cost reduction is undoubtedly the major stimulus for users to investigate the outsourcing alternative, it is not the deciding factor.

Vendors cannot therefore hope to attract business through cost cutting alone. They have their hands pretty much tied concerning the two most frequently iterated user requirements for:

- Increased geographic cover
- Proof of service quality

The former is frequently made problematic by PTT competition in Europe and resultant restrictions on geographic cover. Additionally, lack of experience with test sites and therefore proof of expertise are hurdles which will frequently be met when approaching corporations.

As geographic coverage is largely out of vendor control, to gain initial credibility, vendors should offer restricted service products for niche market entry.

Characteristics of Key Outsourcing Candidates

Learning from the comments and concerns of corporate network planners, the following list of potential user characteristics has been compiled and summarised in Exhibit 2.

Although they are obviously not exclusive, and attracting the most promising opportunities is also strongly dependent on vendor capabilities,

Exhibit 2

Characteristics of Key Outsourcing Candidates

Organisational	Network
<ul style="list-style-type: none"> • Network not core business activity • Loss industries • Strong service orientation • Competitors taking the lead 	<ul style="list-style-type: none"> • Private network development low • In-house management team not strongly established • Nationally biased • Limited international requirements

Source: INPUT

the following illustrate the main factors that will render a user a more promising outsourcing prospect:

- The network should not be central to the main business activity of the company. Non-core business activities are the first to be considered for outsourcing.
- The organisation should not have invested heavily in a private network development. Consequently, the user is unlikely to have a strongly established in-house team.
- If a company is making a loss or has a low return on investment, it is likely to be seriously looking to cut costs in non-core activities.
- Medium-sized companies where network demands are not as inherently complex as the major multinationals are more likely to have requirements that can be met by the current services available.
- Organisations that have a strong, service-oriented culture are more likely to be open to outsourcing as part of an overall policy decision.
- Nationally biased organisations (particularly for total network solution services) are unlikely to require large-scale international networking.
- Organisations that only require sporadic or restricted international connections are good candidates for services that will simply facilitate a geographic extension to the network but not management control. Frequently in these cases a private network cannot be cost justified and alternative services are sought.
- It is to the advantage of vendors to be in an industry where competitors have already led the way by successfully outsourcing all or part of their networks.

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Research Bulletin

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A Publication from INPUT's Network Services Management Programme—Europe

Embryonic EDI Markets Opportunities for Leadership

Electronic Data Interchange (EDI) is one of the fastest growth sectors of the telecommunications market in Europe. Exhibit 1 illustrates INPUT's predicted EDI market growth to 1997.

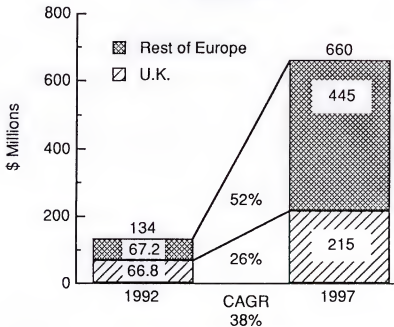
The market cannot be usefully strategically targeted as a coherent whole. A strong indicator of this is the comparison of the weaker growth and market size in the U.K. to the rest of Europe (ROE).

In view of this, INPUT examines the market at three levels:

- The country level where the highest number of restrictions and characteristics are in play to influence the market. This can be through PTT monopoly, regulations, economic restrictions, or government intervention.

Exhibit 1

EDI Market Growth
1992-1997



Source: INPUT

- Changes in EDI expenditure in terms of network services, professional services and software. Trends in expenditure are largely influenced by the maturity of these individual country markets.

The disparities between the size of country markets is a direct result of a number of influences:

- The industry-specific level. Despite the strong vertical orientation of EDI, individual countries and the restrictions on or promoters of the technology are influential largely on a country level.

Vendors of EDI products and services need to be aware of the differences at these levels in order to focus their marketing strategies. Country market developments and the resultant level of maturity are the most important determinant of strategy.

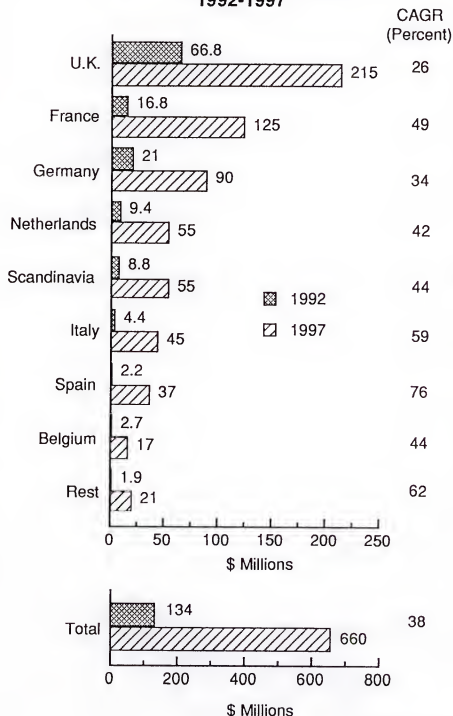
(All of the forecasts given are for the third-party EDI software and service markets, which use public standard, rather than proprietary, data formats.)

Country Growth Rates Vary by Up to 50%

The high level of disparity in Europe means that individual countries are having very individual experiences with the technology. The relative growth and size of the country markets in Europe are illustrated in Exhibit 2.

Exhibit 2

The EDI Market in Western Europe 1992-1997



- The economic climate
- The PTT monopoly status and regulatory environment
- Government intervention, subsidies and promotion
- Telecommunications infrastructure development

The U.K., which has been positively influenced by most of these factors, accounts for half of the total market value in Europe in 1992. However, the relative maturity of the market and poor state of the economy have resulted in a growth of just 20% between 1991 and 1992. Excluding the U.K. from the total European figure shows a much healthier picture.

Over the five-year forecast time period, those countries showing the greatest growth, i.e., CAGRs of around 65%, are starting from the lowest levels of installations. Consequently, despite the high growth, they will not be of comparatively great value by 1997.

These countries include Spain, Italy and the rest-of-Europe category, which includes Austria, Switzerland, Portugal, Greece and Ireland. There are a number of factors which have held back the development of EDI within these markets. Spain, Portugal and Greece have suffered from poor telecommunications infrastructures, which detracts from these countries' attraction as investment for VAN (value-added network) service providers. Without a strong supporting network infrastructure, EDI activity is limited.

Telefonica is increasingly investing in Spain's digital infrastructure, which is resulting in the Spanish market's becoming of key interest to both telecommunications equipment and services suppliers. This is reflected in high growth in the Spanish market over and above the rest of Europe.

Portugal and Greece, however, are still lagging behind the majority of countries in Europe with respect to network infrastructure development. Partially as a result of this, the relative values of these markets will remain low up to 1997.

Switzerland and Ireland have far superior digital infrastructures but are small markets purely due to their sizes. Both countries will experience a high level of growth over the forecast period, although within this constraint, which will force the markets to remain comparatively small. One of the main influencing factors on the development of the Swiss market is the banking community, which is waiting to implement EDI through SWIFT. The Swiss banks have not opted to take the individualistic approaches characteristic in particular of the U.K. market.

The Dutch, Italian and French markets will experience a high level of growth. This is partially a result of the support that EDI is receiving from the governments within those countries; the government sponsorship of EDI through the Department of Trade and Industry in the U.K. was one of the initial catalysts to growth. This contrasts with the slower growth and indifferent government activity in Belgium.

The French market will experience very healthy growth in particular, owing to a number of factors. The telecommunications infrastructure is easily accessible to potential VAN providers. The regulations in this area are currently very open with a simple declaration of the network size and service provided being needed to enter the market.

Additional advantages are the government involvement in the form of EDIFRANCE, which is responsible for promoting EDI, and the proactive role of Transpac in the development of EDI products and services. As has been seen with packet-switching networks in Europe, a high level of exposure to network service types through a reliable public offering, rather than detracting too heavily from the

private market, will often help to promote the technology as a whole.

Finance and Government Sectors to Show Greatest Growth

EDI is the most vertically oriented market in telecommunications. This is fuelling the fast development of standards in comparison to other areas of the market. It is such a strongly user-driven market that it is one of the few areas in telecommunications which is most likely to succeed in the widespread use of an agreed industry standard, i.e., UN/EDIFACT. This will be within a relatively short timeframe in comparison to the standards-making process, for example, for ISDN.

Particular vertical markets are more suited to using EDI in terms of their business and production activities. They are therefore at very disparate stages of development in terms of EDI use.

The initial and most readily recognisable benefits of EDI are in the reduction of administration costs and improvements in stock control and customer service. It is in these areas where benefits are most easily quantifiable in terms of reduction in costs and time associated with transactions with external trading partners. This has been realised in the pattern of vertical market uptake of the technology.

The largest vertical market is currently in the manufacturing sector, which accounts for 44% for the total market value in 1992, with discrete manufacturing accounting for 34%.

In view of the trend towards improvement in pan-European communications and the increasing facility to achieve this through transborder network services, the retail and distribution sector, transport sector and the business services sector reflect a high level of EDI activity. The relative size and growth of a number of vertical sectors is illustrated in Exhibit 3.

The markets that are going to experience the most growth over the forecast period are banking and finance, and government. There is currently a low penetration in these markets, and the progression down the supply chain to include electronic payments and progression of the SWIFT EDI project will serve to encourage the banking market in the medium term. Additionally, the outsourcing and cost-cutting policies of governments will aid the development of the market in terms of administrative cost cutting.

Expenditure Mirrors Market Maturity

The relative proportions of the market value in terms of components will remain stable over the forecast period for Europe as a whole. Levels of maturity of individual country markets will, however, influence expenditure in these categories.

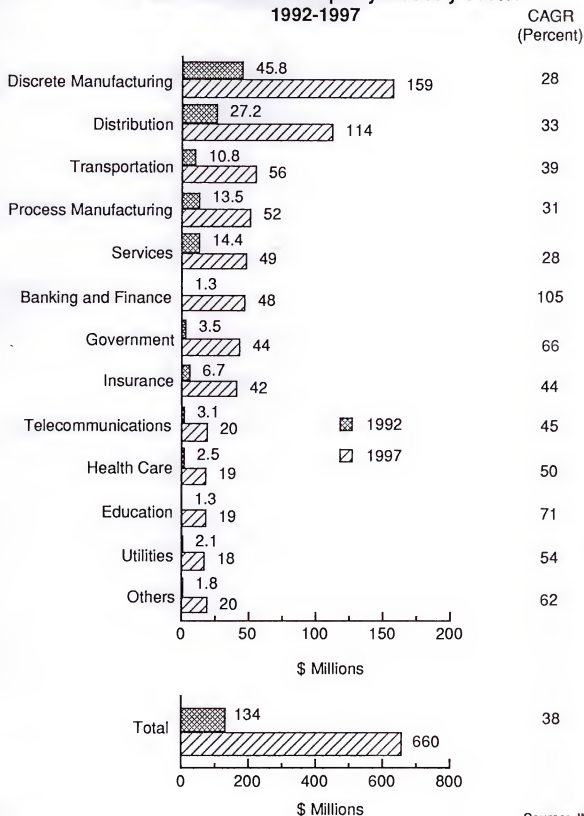
The proportion of expenditure by EDI market component is illustrated in Exhibit 4. Currently, the majority of EDI expenditure is on network services. This will remain the case to the end of the forecast period. The increasing level of competition in the market as network services become more open will predictably, however, result in a decrease in the cost of these services. This will in turn reduce actual spending, although usage and network numbers will continue to increase.

Professional services expenditure is currently in its greatest period of growth. This reflects the early stages of development of EDI in the majority of European countries and the resultant high requirement for outside support in the implementation of systems and restructuring of information flow within organisations.

As markets mature the software will retain its proportion of the EDI expenditure despite inevitable price decreases. This will be due to software replacement when companies reach a critical mass of trading partners and enhanced software that will increasingly be required to

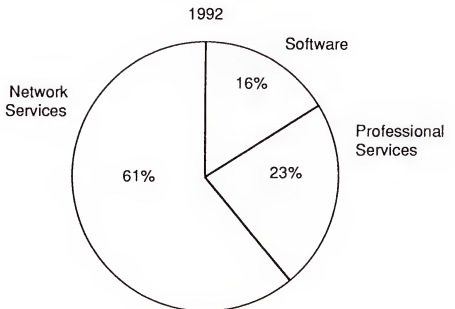
Exhibit 3

The EDI in Western Europe by Industry Sector 1992-1997

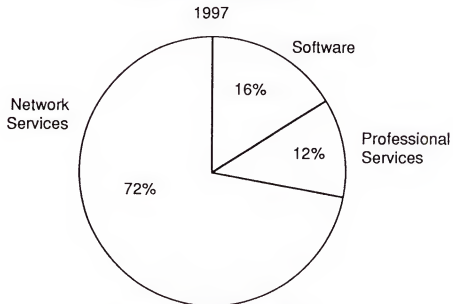


Source: INPUT

Exhibit 4

**EDI Market Components
1992 and 1997**

Total Market: \$134 million



Total Market: \$660 million

Source: INPUT

accommodate increased throughput requirements.

Hub Users Lead to Strong Market Penetration

Given that the EDI market is still in the very early stages of development in the majority of European countries, there are a great deal of market opportunities open to vendors. The success of a particular vendor will be determined by its approach to the market. The two main factors that should determine this approach are vendor size and the stage that a given country market has reached in the cycle of maturity.

The smaller vendors are restricted in their approach to software and professional services. The limits for these companies on offering international network services are obvious. The nature of the EDI market and the push to standardisation, however, facilitates competition for software on an international basis.

In the longer term, in order to survive in country markets that are maturing, the smaller vendors will be forced to

- Establish partnerships with network providers
- Specialise in vertical niche market offerings

These approaches will become more crucial to the survival of the smaller companies as competition increases across Europe alongside deregulation.

Additionally, the network providers will benefit from the ability to offer in-house software expertise alongside their services. This will

serve as a market distinguisher as competition increases.

The more mature the EDI market becomes the less penetrable it will be. The market entrants that are successful at the 'hub' stage of market development will be the ones that will become the market leaders in the long term. The success and high market share of INS and the widespread use of Tradanet in the U.K. illustrate this.

The user-driven nature of the EDI market is such that at the initial stages of vertical market development the 'hub' EDI users, through the encouragement of trading partners to use the technology, are predominantly responsible for market development and growth. Vertical sectors are set to become more horizontal through increased use of EDI further down the supply chain. In the majority of countries in Europe, however, vertical markets are at such embryonic stages that the opportunities are still open for vendors to lead selected markets.

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Network Services—Market Growth Despite Economic Slowdown

The use of network services is both a natural progression from private networking and an increasingly available and attractive option for organisations with new data networking requirements.

The corporate data network is no longer the sole realm of technical experts. Particularly in a recessionary environment it is becoming viewed both as a financial burden and a valued business asset. Increasingly, organisations are taking stock of their corporate networking costs and investigating alternative means of satisfying their networking needs.

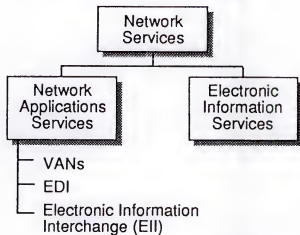
As a result of these changing user attitudes to the network and emerging new business practices, for example, electronic data interchange (EDI), the network services sector overall will continue to grow in value well into the decade, at an average rate per year of 17%. Despite strong recessionary pressures over the past year, in particular in the U.K., which constitutes a large proportion of the overall market, the market overall has sustained growth over and above many sectors in the software and services industry. Market size is expected to reach a value of over \$10.5 billion by 1997.

INPUT divides the network services market into a number of component sectors. The formal definition of network services shows a

market that comprises two principal subsectors, Network Applications and Electronic Information (EI) services. Exhibit 1 shows the components of these subsectors.

Exhibit 1

Network Services Market Components



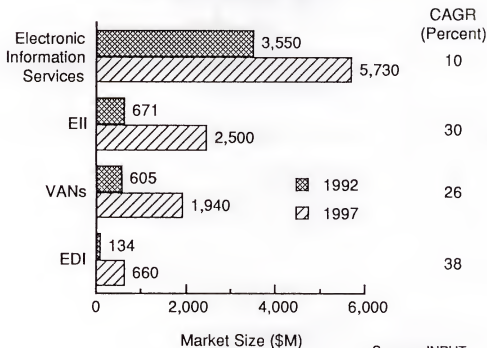
Source: INPUT

Growth Patterns Reflect Market Size

The market subsectors as defined by INPUT above are currently at various degrees of development in Europe. As a result they will encounter quite varying rates of growth, as illustrated in Exhibit 2.

Exhibit 2

User Expenditures on Network Services Europe, 1992-1997



Source: INPUT

The EI market is currently the largest sector of the network services market and will continue to grow in size over the forecast period. The greater maturity of this market, however, in comparison to Network Applications will create slower growth, with the Network Applications market reaching a comparable value by the end of the forecast period.

In contrast, the smallest market—that for EDI—is proving to have the greatest area of activity and will show the strongest growth at a rate of 38% on average per annum for the next five years.

The U.K. is currently by far the most developed economy in Europe in terms of EDI usage, but the remainder of Europe is swiftly installing EDI. The major users of the technology, i.e., the 'hub' accounts, combined with the trading partners' drive to promote the technology

within industry sectors, will have a ripple effect on the market's development.

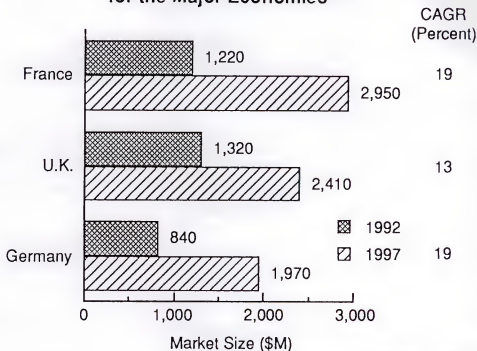
Highest Growth in Germany and France

Currently the U.K. and France are substantially the largest markets in Europe for network services. This is strongly weighted by the use of EI services by the financial sectors in these markets and in particular the U.K. Exhibit 3 illustrates the comparative size and growth of the network services markets in the major economies.

The major constraints on the network services market are imposed by the PTTs and regulatory bodies. The current moves to liberalisation and greater freedom in Germany, combined with the country's economic size, will free the Network Applications market to grow substantially over

Exhibit 3

Network Services Market Growth for the Major Economies



Source: INPUT

the next five years at a greater rate than France and the U.K. The total French market will overtake the U.K. to have the highest value in Europe in 1997.

Vertical Network Services Market Growth Greatest for Government and Distribution Sectors

Exhibit 4 provides an analysis of the expenditure on network services by industry sector. The largest market currently is the banking and finance sector; this is predominantly as a result of the high level of use of EI services in this industry sector.

Network application services are currently most strongly used by the distribution and manufacturing sectors. Manufacturing, in particular the discrete manufacturing sector, was the first industry to strongly support the

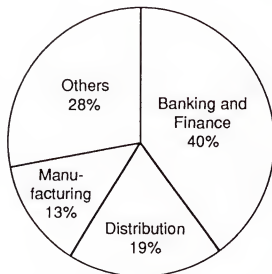
use of EDI services in Europe. This trend is being closely followed by developments in the distribution sector.

Banking and finance will remain the greatest market in terms of user expenditure, closely followed by the distribution sector, which will experience substantial growth over the next five years.

Another high-growth market will be the government sector, where the use of outsourcing as policy is more readily accepted and electronic processing is being increasingly investigated to rationalise administrative functions. Additionally, the insurance sector will experience substantial growth as a result of specialist industry networks within sectors in the insurance market, which are continuing to be developed.

Exhibit 4

Industry Market Analysis Network Services



1992 market size \$4,960 million

Source: INPUT

market, a specialist independent network provider and a telecommunications organisation. In the less fluid EI market, the dominant vendors are more specialised in the field, in particular Reuters, and have maintained stable competitive positions.

The presence of IBM, GEIS and BT illustrates the diversity of the suppliers that are active in the Network Applications market. At the individual country level, however, the picture is different. Here individual PTTs such as BT, DBP Telekom and France Telecom, by virtue of history and monopolistic positions, continue to hold the strongest positions in their indigenous markets.

PTTs Continue as the Dominant Vendors on a Country Level

Within the two subsectors of the network services sector, i.e., Electronic Information and Network Application services, the leading vendors are from very different backgrounds.

The leading Network Application vendors, in order of market position, are IBM, GEIS and BT, whereas the dominant Electronic Information Service vendors in order of rank include Reuters, Telerate and Dun & Bradstreet.

As this shows, the Network Applications market on a Europe-wide level has been dominated by a supplier from the computing

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Research Bulletin

Route to:

A Publication from INPUT's Network Services Management Programme—Europe

AT&T Istel Aiming for European Top Three Position by Year 2000

AT&T Istel's main areas of activity are value-added data services (VADS), computer applications processing, general systems, and systems and consultancy. Each area currently constitutes approximately one quarter of the company's total revenue, which exceeded £173 million in 1991.

AT&T Istel's stated goals regarding Europe are to increase its revenue in this region to £1 billion within five years, and by the end of the century it plans to be in the top three European IT services companies. This would require, it predicts, growing to a revenue of £1.5 billion.

To reach its goal in terms of revenue would require a growth rate per annum on average of 27% up to the year 2000. Growth on this scale has already been achieved from 1982 to 1991, when revenues grew at an average yearly rate of 24%. Exhibit 1 illustrates the growth in revenue that has been achieved since 1980.

Current Positioning

AT&T Istel's original communications asynchronous network was called 'Infotrac'. It was originally developed for videotex applications for the automotive and travel industry. To cope with the demand for greater bandwidth, a new network has been developed in the U.K. with 70 nodes and one per country in Belgium, Germany, Spain, the Netherlands,

Italy, Sweden, France, Austria, Switzerland and VSAT (very small aperture terminal) access to countries in Eastern Europe.

A management centre in Redditch in the U.K. provides central control for the network in Europe.

In the network services area AT&T Istel's main service offerings are

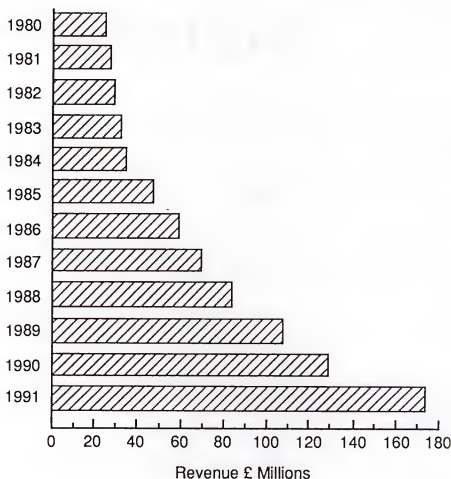
- AT&T EasyLink Services, which brings together the messaging skills of AT&T, AT&T Istel and Western Union. The unit offers a range of products and services for electronic data interchange, electronic mail, and other enhanced messaging services, such as AT&T Enhanced Fax.
- AT&T's managed network services—a more recent development that is now being offered in Europe. These services include the AT&T ACCUNET Spectrum of Digital Services—Europe and the AT&T ACCUNET Packet Service—Europe; access speeds of up to 64 Kbps are available.

Growth Measures

An indication of the company's determination to achieve its goals is the current level of investment in Europe, which stands at an estimated £50 million, and the establishment in

Exhibit 1

AT&T Istel's Revenue, 1980-1991



Source: AT&T Istel

1991 of a group within the company which has been dedicated to the development of business in Europe. The task of the group is to ensure that the company is positioned to achieve revenues of £500 million from non-U.K. sources by the end of 1995. The main vertical markets that will be concentrated on in continental Europe are financial services, manufacturing and health care.

The speed with which the company wishes to expand its presence in Europe has led to the adoption of an aggressive acquisition strategy as opposed to relying predominantly on organic growth. Acquisitions in Europe are designed to

supplement European-wide presence as well as augment the skill base of the company.

AT&T Istel has made several important acquisitions in the U.K., and in 1991 it acquired its first continental European company, Infoplan, in Germany. AT&T Istel is acquiring companies of medium size that specialise in a wide range of services in the IS market. Infoplan, which is a systems software house, had a 1991 revenue of DM 43 million and employs 185. The company brings specialisation in computer integrated manufacturing, production planning and control, facilities management and consultancy.

A further acquisition in Germany in 1992 included Computeranwerdungs-Beratungs (CAB). This is a software house specialising in applications programs, primarily based on the UNIX operating system. Also provided are bespoke developments and training for the manufacturing industry.

An additional acquisition for the development of the presence in France was Dataid, a major supplier of IT services with an established presence in the French outsourcing market. Overall, Dataid specialises in professional services, facilities management and industrial, scientific and technical systems.

Expansion plans are also taking the form of further development of the network infrastructure. Additional node sites are planned for the South of France to serve the *high tech* industry there. A number of node sites are planned for Germany to help minimise customer distance from the network and therefore help to lower the high cost of leased connections that prevail in the country.

A further management centre to supplement the one already active in the U.K. is planned for the Netherlands. This site was chosen because of a strong relationship that has been established with PTT Telekom and the more open, less nationalistic environment in the country. Further development of management sites will probably include France and Germany, and there are also plans for a similar development in the Far East.

In terms of technical capability and service availability, the overall aims are to mirror the service levels available in the U.S. Initial developments in this area include a frame relay connection service over the network for LAN interconnection called the AT&T Interspan Frame Relay Service—Europe. Further stages of development are planned to include videoconferencing and in the longer term cell relay and eventually, pending deregulation, business-to-business voice traffic.

Rapid European Expansion but Current Level of Revenue Limited

AT&T Istel's strengths and weaknesses are summarised in Exhibit 2.

The size of AT&T in the U.S. and its determination to ensure its presence in the world market provide AT&T Istel with very strong financial backing. This is supplemented by the additional research and development activities through the AT&T Bell Laboratories in the U.S.

AT&T has obvious strengths in voice and data networking expertise which supplement the data processing and facilities management activities, which have traditionally formed the core of AT&T Istel's activities. This gives a strength of skill mix which is becoming increasingly crucial in a market where integrated solutions are key.

Although the company is rapidly expanding its network presence across Europe, business generation in the region is still limited, as is a direct presence by the company. Approximately 90% of AT&T Istel's revenue is currently generated in the U.K., with the remainder coming mostly from Germany. The company, however, has strengths in the presence of AT&T and NCR offices throughout Europe, which it is capitalising on. The node sites for the managed network service have been established in AT&T offices, and the management site in the Netherlands will use NCR premises.

The high level of AT&T Istel's acquisition activity will inevitably augment its direct presence, although consolidation activities will inevitably create a lack of coherence in the short term.

AT&T Istel's approach to the market is to concentrate sales activities by industry-specific sectors. This has generated a high level of expertise in the needs of particular clients, in particular in the manufacturing industry. A

Exhibit 2

AT&T Istel: Strengths and Weaknesses

Strengths	Weaknesses
Strong financial backing from AT&T	Low current continental European presence
Research and development activities	Segmented skill base
Wide range of capabilities	Growth through acquisition
Pan-European network infrastructure	Consultancy expertise
Strong U.S. customer base	
Vertical market expertise	
Relationship with NCR	

Source: INPUT

strong vertical market approach, however, will lead to a lack of generalised expertise that may handicap expansion in the long term. Current reorganisation within the managed network service (MNS) area has, however, brought the MNS sales, technical support, product management, delivery and marketing together as one *horizontal facing* organisation to build a centre of expertise.

The lack of historical presence in continental Europe will inhibit the ability to win continental European clients. The client base is currently very strong, however, in the U.K., and in the U.S. through AT&T. The company will concentrate on the international networking needs of these clients as their requirements grow, taking an account management approach

to the market. It has indeed been the major U.S. multinational clients of AT&T that have been the catalyst to expansion of services into the European market.

Consulting activities have not been a strength of the company. AT&T Istel has, however, been taking measures to improve on this, partly through the acquired companies in Europe, which are generally well established in this area.

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Amadeus Prepared to Outsource its Entire Network

Amadeus Data Processing is a subsidiary of Amadeus Global Travel Distribution SA. Formed in 1987, Amadeus is a privately held computerised distribution and reservation system for the travel industry. Through a centralised database and processing centre, travel agents are linked with travel service providers worldwide.

The company states that it would be willing to spend its total networking budget on outsourcing for the right service, but currently costs and service availability in Europe prohibit this. Even if a vendor was seen as capable enough, the company would not be willing to exchange what it sees as one monopoly for another by using only one supplier—at least two would be more acceptable.

Current Network Configuration

The Amadeus project was initiated in Europe in Munich in 1990, following a test site in Stuttgart in 1989. This followed initial development in Miami in 1989.

The first international link from Germany was to Spain, closely followed by a link from Germany to France. Access to France and Spain is via public X.25 networks with access to Germany and Scandinavia via private lines.

The status of the current network is illustrated in Exhibit 1.

The airlines generally have 2Mbps connections to the network with travel agents needing only 9.6Kbps.

The equipment on the network is a combination of IBM and Unisys.

The network was developed with the overriding principle to use whichever communications method available was most cost effective. One of the main problems which the company is facing currently is meeting the cost of running the network, paying the various network providers, adding value to the network for its customers and still managing to maintain a profit level.

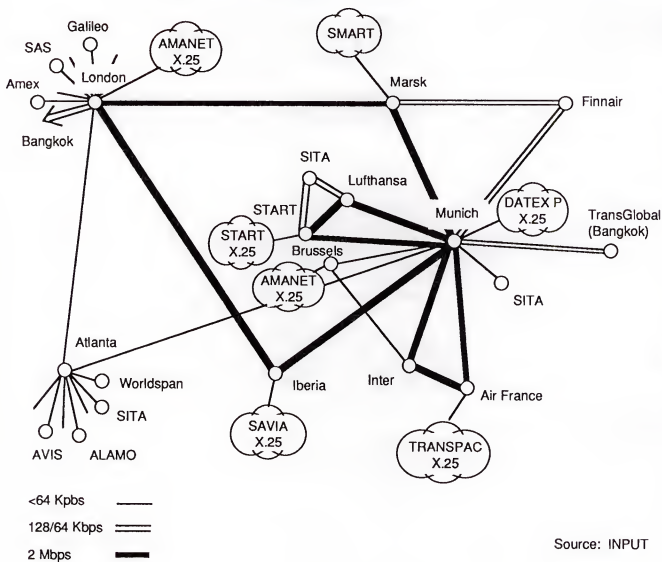
One of the most crucial considerations is the maintenance of the network, which for normal service from providers is only covered from 09.00 to 17.00. A premium is paid within special contracts for 24-hour maintenance of the network.

BT/Syncordia Services Used

BT has been used in London since 1990 to provide facilities management for the London and Atlanta nodes. The equipment is owned by

Exhibit 1

The Amadeus International Network



Amadeus; however, a service-level agreement is in place with BT for the monitoring and diagnosis of the network and problems associated with it. BT was not required to configure the network or act in an advisory capacity for planning. Amadeus takes a complete service package from BT, which includes BT providing the infrastructure, the ordering and installation, single-end billing and provision of 64Kbps circuits Eg from London to Thailand.

In the U.S., Amadeus is currently using services provided by Syncordia (a BT subsidiary). Syncordia was deployed to handle the expansion into North America, preventing the need for Amadeus to increase staffing.

Under a three-year service contract, Syncordia is providing a network hub to link North American travel-related database services to the centre in Erding. Syncordia provides and manages two transatlantic circuits to Erding and London. The company also houses and

maintains multiplexers in its Atlanta-based network control centre to support the Amadeus network in the U.S.

Amadeus wishes to expand its services internationally.

Current domestic services are at a sufficient level, but the company needs a truly international basis. This is foreseen in particular for the Far East and South America.

Currently, Amadeus has no specific problems with the network. The aim, however, is to retain a quality service for its clients and to reduce costs in order to pass this saving onto customers.

The Right Service Is Not Available

The company believes that outsourcing should be a carefully managed and phased process, involving a test phase for the vendor before handing over further responsibility. The feeling is that outsourcing is too risky a step to take too quickly, and that only experience with a vendor can prove its worth, no matter how confident the customer is in the vendor's abilities.

For Amadeus, the most difficult issue currently in Europe are the local loops over which most of the PTTs have monopolies. This leaves the customer again relying on local carriers.

Advice to a new vendor attempting to enter the market was that the most positive offering they could have would be bandwidth-on-demand, with a great deal of spare capacity to provide services and ensure maximum security. There should also be no single point of failure. For video, image perfection is of great importance. Also, billing should be clear and concise.

One networking problem which outsourcing would help to alleviate would be the problem caused by highly trained remote personnel. The requirement is to have a high level of technical skills at each site in cases of emergency, but the

tendency is for boredom to become apparent and for skilled staff to be easily lost.

A further consideration is the lasting effect which outsourcing can have on in-house personnel. The skill requirements, because of outsourcing, change, and responsibility levels, are low. This creates a less stimulating environment for the personnel which remain. The main fear expressed by Amadeus is the inability to regain control should it be necessary once the network has been handed over to a third party.

The reluctance of Amadeus to consider outsourcing much further is mainly a result of costs, which it feels are still unrealistically high. Additionally, the vendors are giving unclear indications of strategic direction, which is creating confusion.

High Service Costs Prevent Serious Consideration

Amadeus is open to the idea of outsourcing and has used such services to a modest extent for connections from Germany to the U.S. and in London. The company would be willing to use further services but felt that what it required was not available at a reasonable enough cost in the market.

Summaries of the main points raised are given in Exhibits 2 and 3.

Exhibit 2

Key Requirements for Service Provision

- There should be no single point of failure
- Bandwidth should be available on demand
- Vendors should offer clear/concise billing

Source: INPUT

Exhibit 3

Concerns about Outsourcing

- Two suppliers should be used to prevent a monopoly situation
- Slowly phased test periods should be used
- Currently costs are unrealistic
- Vendors have unclear strategic direction

Source: INPUT

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Users View Network Outsourcing with Caution

The market in Europe will undoubtedly become more open to the outsourcing of network services. Primarily it is being driven by the increasing deregulation of the market and gradual relaxation of PTT monopolies.

Network and technical developments are creating an increasingly complex environment for network management, which in turn increases the level of skill with which technicians have to operate. High expenditure on personnel and often a lack of appropriate skills result. The level of competition on which companies are having to operate is also becoming increasingly globalised, which is creating pressure to increase network coverage on a worldwide scale.

With these factors in mind, however, the market is being held back. This is predominantly caused by vendor credibility; on the whole, users in Europe do not believe that using a third party will facilitate a cost-effective improvement over their current situation. This mainly manifests itself in a distinct lack of trust in outside providers' capabilities. Therefore, combined with the still highly restrictive influence on the market of PTT monopolies and control, European companies are still much more sceptical about outsourcing their networks than their U.S. counterparts.

Vendors therefore have the challenging tasks of convincing users of their capabilities and, faced with PTT restrictions, of providing services which are at a reasonable price level and which are comprehensive enough to provide users with what they really require.

The most important task for vendors is to generate a level of trust through partnership or working closely with a user. The process of handing over the network is a slow and gradual one which requires efficient and sensitive handling on the part of the vendor.

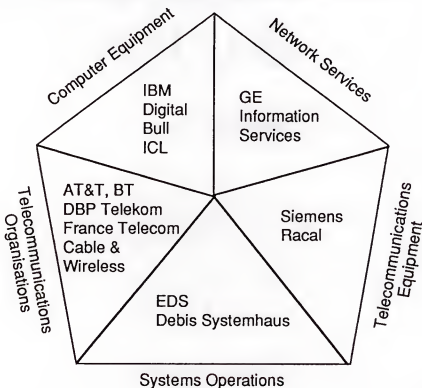
Vendor Strategies To Target "Top 1,000"

It is indisputable that there will be a time when Europe will be at a stage of development, in terms of telecommunications deregulation, comparable to that currently enjoyed in the U.S.

One of the main contributors to market growth is undoubtedly the deregulation of the PTT monopolies in Europe, and the resultant competition between an increasing number of vendors. Equipment and service providers from all corners of the IS world are now attempting to claim their share of the major multinational accounts on a worldwide basis.

Exhibit 1

Vendors Active in Network Outsourcing



Source: INPUT

A key vendor goal currently is to be recognised as a world-class provider of systems integration capabilities, i.e., as defined by INPUT, the vendor service which provides a complete solution to an organisation's information system requirements. A major part of this service will include networking as businesses become more global in nature.

This inevitably extends to the integration of network communications, whether it be for voice, data or image. As illustrated in Exhibit 1, network outsourcing vendors are emerging from a great many specialist areas of the IS market, e.g., computer equipment, network services and telecommunications services.

A great deal of activity in terms of alliances and acquisitions is occurring in order for vendors to illustrate their capabilities as global providers of the whole spectrum of services and products

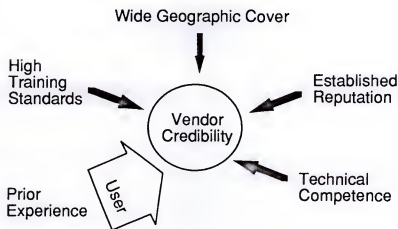
which major users require, including the management and provision of networks.

It is the belief of many of these companies that a small number of vendors will emerge as world-dominating systems integrators, developing their presence through the targeting and account management of major international corporations.

Many of these vendors have stated that they are targeting the key corporate, multinational accounts which are commonly identified as The Times, or Fortune, Top 1,000 listed companies. These major accounts contribute a huge proportion of the total telecommunications expenditure worldwide and nationally within each individual country market. The attraction of single vendor accountability and responsibility to many users will continue to drive the increased service coverage of all vendors in the IS market.

Exhibit 3

Key Vendor Selection Criteria



Source: INPUT

Additionally, expertise in terms of technical skill and competence and a high level of vendor in-house training in order to maintain these skill levels was very important to the users.

Cost was not raised as a major selection criteria. In terms of pricing, however, users wanted a clear tariff structure which incorporated flexibility.

Recommendations to Vendors

Experience from research in the U.S., where the market is more developed, has shown that users that are using outsourcing services are predominantly satisfied with the services which they receive. Most of the benefits promised by vendors had in fact been realised. The main conclusions of research conducted by INPUT in the U.S. are given in Exhibit 4.

It is up to vendors in Europe to convince potential users that these benefits can in fact be realised. Vendor recommendations (see Exhibit 5) are based on INPUT's analysis of user needs and opportunities in the market.

In order to attract the major worldwide accounts at the market's current stage of development, the main task for vendors is to prove global capabilities and to engender a

strong level of trust with a potential client. Given the market restrictions and underdevelopment of the market in Europe, this is not an easy task. Vendors are often restricted in their global capabilities end-to-end through the PTTs and few already have major contracts for network outsourcing services with which they can prove their capabilities.

In order to make a significant impact in the future in this market, the approach to take should be careful account management of current and potential major clients.

Vendors should take a very gradual approach and not attempt to over promise in order to gain key accounts, which could detract from credibility with the user organisation. An entry level approach such as simple circuit provision or node management is a very important stage to establish credibility in the short term. This could enable a progression of commitments with increasing levels of service and control resulting.

The network outsourcing relationship should be a long-term partnership between a company and its vendor. In order to generate trust, a vendor's motivations and goals and the user's network goals should be shared and understood in the initial stages.

Exhibit 2

Major Reservations on Network Outsourcing

- Loss of control
- Loss of creative management
- Monopoly situation
- High costs
- Unclear vendor strategic direction

Source: INPUT

Users Fear Loss of Control

The main negative theme surrounding the issue of network outsourcing is the fear of a loss of control on behalf of the organisation outsourcing the network. The main issue arising from this is the perceived inability to regain control over the network at a given point in time if desired, or if it proved necessary because of vendor inadequacy. Further user reservations are given in Exhibit 2.

The major loss that would not easily be regained would be loss of in-house technical expertise, which is becoming an increasingly crucial asset. Additionally, there is concern that a lack of real interest on behalf of the service provider in the performance of the network would replace in-house creative management of network development and optimisation.

Users are not attracted to the idea of only one service provider being in control of the network. This brings the fear of being subjected to a monopolistic situation that simply replaces the controls imposed by PTTs.

Although the cost issue is becoming increasingly crucial for users, network service providers are viewed as charging unrealistic prices for their services and the general opinion is that costs would be lower if the management was kept in-house.

Further, there was concern about the strategic direction of potential service providers. Users want to know how vendors will develop their expertise and services in order to see if there is an alignment between the vendor's goals and their own, and that it is in their own best interests.

Vendor Credibility in Question

On the whole, the users INPUT interviewed did not believe that using a third party could facilitate a cost-effective improvement to their current situation. The idea of outsourcing to a vendor with the right credentials, however, was not excluded, and most were open to the idea to some extent.

The main issue to be addressed is the credibility of the potential vendor. Amongst those users with outsourcing experience of any kind, this credibility, it was strongly felt, could only be built up through close knowledge and experience. This enables a great enough level of trust to develop for a gradual lessening of control on the part of the in-house staff, with control gradually being relegated to the service provider. This method also facilitates a low level of disruption to the user organisation, which can be controlled in a highly phased and staged process.

A user having no direct experience of a particular vendor would, in the majority of cases, exclude them almost totally from consideration. The exception could be a service provider that had a good and established reputation in the market, although this could still be approached with a very high level of caution.

Exhibit 3 shows the key criteria for vendor selection.

For the user the size of the vendor organisation was particularly important, with the consideration in mind of future development worldwide.

Exhibit 4

U.S. User Conclusions

- Significant cost savings
- Network reliability and availability increases
- Users satisfied
- Users can focus on core business

Source: INPUT

Exhibit 5

Vendor Recommendations

- Establish close relationship/
partnership with client
- Entry level approach
- Don't over promise
- Demonstrate clear strategic goals

Source: INPUT

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GE Information Services— Taking the Consultancy Approach

CA LIBCOM

GE Information Services has grown on the success of its parent company's, General Electric's, early entry into the processing services market in the U.S. MARK I was the first interactive processing service to be made commercially available in the U.S.

Having grown to become the market leader in network services worldwide, the company is now focussing on offering a more comprehensive service to its customers. The company is concentrating on a change of focus from transaction processing, and other more basic network services such as EDI, to a consultancy and solutions approach.

GE Information Services particularly is cultivating a consultative approach to customers, with the ultimate goal of being recognised as a major systems integration vendor.

In order to achieve this goal, the company recognises a need to develop and strengthen its partnership relationships.

Business Developments

The company plans to continue to generate growth organically rather than through acquisition. To facilitate this, strategies will be used in order to service the maturing

requirements of its current customer base, as well as those of prospective clients.

GEIS's approach is threefold:

- To focus on functional applications
- To target growth in chosen vertical industry sectors
- To position itself as a provider of consultancy services.

The company is concentrating on functional processes as it accepts that it cannot add value in all market sectors. Functional areas include customer support, sales and marketing, and finance. These neutral functions are designed to apply to most organisations irrespective of their industry sectors, enabling the company to enter markets where it has no specific industry expertise and thereby broadening its customer base.

The concentration on vertical industries facilitates the provision of complete services for these particular industries, rather than attempting to offer everything in every industry sector. The focus industries world wide are financial services, transport, retail and petrochemicals.

The overall strategy is to offer consultancy in order to provide highly customised systems through the exploitation of the basic technologies such as EDI and messaging services. The company aims to offer a 'complete service deployment function' with the use of third-party services where necessary.

Alliances and Partnerships within Target Markets and Consultancies are Key

GE Information Services strengths and weaknesses are summarised in Exhibit 1.

Exhibit 1

GE Information Services Strengths and Weaknesses

Strengths	Weaknesses
Established European presence	Revenue levels from consultancy services
Organic growth	Lack of experience in vertical target markets
GE backing	

Source: INPUT

GE Information Services is very well established internationally with approximately 50% of its revenue derived from outside the U.S. INPUT estimates that the proportion of revenue in Europe in 1991 for GE Information Services itself totalled \$234 million and was proportioned by country as illustrated in Exhibit 2.

GE Information Services has achieved this geographic coverage through approximately 50 U.S. offices and offices in a further 34 countries with global support and access provided by

distributors, affiliates, or private data networks in 60 additional countries.

Many of the offices are established through affiliates, e.g., in Finland this is through Nokia, in Spain, Teleinformatica. However, the offices in Italy, the U.K., France and Germany are subsidiaries.

Each country office provides the following functions: sales and marketing, customer services and technical development and support. Each office is responsible for its own revenue and sales function with local personnel represented. The country office takes the

account management role and is therefore the client's point of contact. It is responsible for instructing the offices of other countries on their role in servicing a particular client's needs should they require services in these countries.

The company has also obtained much of its European growth organically rather than by acquisition. This has enabled a continuity of service and of organisational and business culture.

GE Information Services has also benefited from the strength and size of its parent company, GE. Apart from being major clients of the company's services, GE has also been operational in GE Information Services' expansion into Eastern Europe. The network now has connections in Leipzig, Dresden and East Berlin with an access node in Prague.

In order to achieve its objectives, GE Information Services needs to form alliances and partnerships within the professional services market. Currently, it is estimated that

Exhibit 2

INPUT's Estimate of GE Information Service's International Revenue

Country	Revenue (\$ Millions)	Percentage of Total
France	34	14
Germany	14	6
U.K.	68	29
Italy	29	12
Netherlands	2	1
Belgium/Lux	4	2
Spain	49	21
Switzerland	5	2
Austria	2	1
Sweden	7	3
Denmark	4	2
Norway	4	2
Finland	2	1
Ireland	2	1
Portugal	7	3
Eastern Europe	1	0

Source: INPUT

only 4% of revenue is generated through this channel.

Additionally, the target markets which are to be focussed on, i.e., transport, retail and banking and finance are not estimated to constitute a major portion of the company's revenue at present.

Although approximately 60% of the company's revenue is generated through banking and finance, the majority of this revenue is estimated to derive from processing services rather than from network applications services. The company does, however, have the opportunity to leverage business from these processing services customers.

INPUT estimates that in total GE Information Services only generates 10% of its revenue through these customers in the transportation and retail sectors. The company does, however, have connections to these industries through its ownership of International Network Services (INS), which has a very strong customer base, particularly in the U.K. retail market through INS's EDI service.

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Research Bulletin

Route to:

A Publication from INPUT's Network Services Management Programme—Europe

Strategies for the 'Top 1000'

The network applications services market is a high growth opportunity for IS vendors. The market is being addressed by companies from distinctly different backgrounds including the PTTs, computer services and equipment vendors.

The common goal of these companies, however, is in identifying the worldwide 'Top 1000' as their target client base.

In order to attract or gain additional business from these key accounts, there are identifiable gaps within these companies' respective product and service offerings that must be filled. The shared ultimate goal is to be the prime contractor for supplying all levels of service to the clients, covering computing and telecommunications requirements.

- The PTTs are concentrating on a change of image in order to attract corporate business.
- The specialist network service providers are attempting to generate business away from basic service provision.
- The computer equipment vendors are establishing stronger holds over the client bases through increased service provision.

IBM and GE Information Services Lead in Europe

Overall, network application service vendors originate from three main areas of expertise in the IS market:

- Telecommunications service operators, e.g. BT, France Telecom, DBP Telekom and AT&T.
- Specialist network services vendors, e.g. Infonet, INS and GE Information Services.
- Computer equipment vendors, e.g. IBM, ICL, Digital and Bull.

The current European market leaders are listed with their estimated revenues and relative positioning in the market in Exhibit II-1.

The dominant positions in Europe of IBM and GE Information Services are a direct result of the international presence and historical establishment of these companies. IBM and GE Information Services, despite their different backgrounds, have become established through their large international client bases in the U.S. and Europe, and ultimately widespread global presence.

1993

Exhibit 1

European Market Leaders—Network Applications

Rank	Vendor	Estimated Revenue	Market Share (\$ Millions)
1	IBM	110	10.0
2	GE Information Services	105	9.5
3	Infonet	100	9.0
4=	France Telekom	80	7
4=	BT	80	7
6	AT & T Istel	60	5.5
7	GSI	50	4.5

Source: INPUT

Infonet, however, was established predominantly with the intention of purely servicing what has been recognised as a growing user requirement (without the original established client base).

In Germany, France and the U.K., the position of leading vendor is taken by the indigenous PTTs. This illustrates the continuing strength of these organisations' positions, despite the progression of deregulation across Europe.

In Italy, the picture is different; however, here the main vendors are non-indigenous. This situation has arisen due to the less progressive stance of the Telecommunications Organisation in terms of high quality service and infrastructure provision.

The dominant European vendors represent a wide variety of background industries in IS as a whole. Exhibit II-2 illustrates the leading five vendors in the four major European economies.

Telecommunications Service Operators Concentrating on a Change of Image

PTTs have the most obvious need to leverage business in the network services market. The increasing freedom of the telecommunications market through deregulation means that the PTTs are becoming increasingly exposed to a competitive environment.

In order not to become mere bandwidth providers in the long term, these organisations are having to re-establish themselves and their images as high quality, competitive vendors, drawing on their networking expertise.

These companies have an obvious strong, competitive advantage within their country markets. However, the process of change from a utility service provider, to a highly motivated profit making organisation, is not an easy one.

Exhibit 2

Major Economy Market Leaders

France	Germany	U.K.	Italy
France Telekom	Telekom	BT	GEIS
Sligos	IBM	AT&T Istel	Infonet
SG2	GEIS	IBM	Olivetti
GSI	Infonet	ICL	IBM
Infonet	GSI	GEIS	Finsiel

Source: INPUT

The PTTs are having to change rapidly in terms of business culture and organisation in order to compete with the emerging network service providers that are increasingly emerging from North America.

To do this, the emphasis within these organisations is changing from service types, such as divisions for public switched telephone network (PSTN) services and packet switched data network (PSDN) services, to customer types.

A strategy that BT has adopted is to establish three business units: Business Communications, Personal Communications and Special Business. This structure is followed closely by DBP Telekom in the near future. No doubt many other PTTs will follow the same path.

The advantages that these organisations inevitably hold are their:

- High level of exposure in the market

- Knowledge of their particular country markets
- Widespread presence in the market.
- Protectionist stance that still holds strong in many countries in Europe at present.
- Extensive network infrastructure and networking expertise.

They are at several disadvantages, however, which include:

- Image as a utility service provider, rather than as a profit making organisation.
- Customer resentment over past or current levels of control on the development of services, and use of services in the country market.
- Generally low image as customer support organisations.

Specialist Network Service Providers Entering New Markets

Companies that fall within this category include Infonet, INS and GE Information Services. None of these companies generate a high level of business in other areas of the IS market, such as telecommunications and computing equipment, or software development. They predominantly rely on their network services skills.

Because of this, what is particularly important about these companies is their need to generate profits. Because they are presently in a position of being unable to obtain the alternative streams of revenues in which their other, less network services intensive, competitors are established.

In particular, these companies concentrate on a change of image or direction. Infonet and GE Information Services amongst the network service providers are centralizing on the provision of total networking solutions.

INS, which is essentially an EDI network service provider, is far more restricted in its development due to its ownership by GE Information Services and ICL. The company is, and will remain, U.K. based with European expansion limited to service only through the use of GE Information Service's network. To counter this, the company is attempting to generate alternative revenue streams through the EDI software market that is able to enter on a Europe-wide scale.

GE Information Services and Infonet are attempting to pull away from the more pure services areas, such as electronic messaging and bandwidth provision. Both companies are preparing to offer more in the way of customised business communications solutions.

This should generate more business through their relative established customer bases. GE Information Services, in particular, is increasingly promoting a network consultancy services image.

Computer Equipment Vendors are Protecting their Client Base

The computer equipment vendors have entered the market more through product portfolio expansion than the prospective development of new revenue generation stream. These suppliers are using the provision of network applications services to their advantage in three main ways:

- In order to service the increasing needs of their relative client bases.
- To increase their client bases through mass market, entry level network services, such as EDI and electronic messaging.
- To protect their installed base of clients from competitors, which would be able to leverage additional business with these customers if they used other entry level vendors' network services.

For example, by doing this ICL, through INS, holds a stronger position for gaining business with INS's major corporate clients in the U.S. The company has the task of developing services to satisfy these clients' networking needs to match those available in the U.S.

In this sense, network application services can be viewed as a necessary, but not necessarily profit making, business area for these companies.

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INPUT[®] Research Bulletin

A Publication from INPUT's Corporate Networks Programme—Europe

Internal Organisation— The Greatest Barrier to EDI

The majority of EDI users in Europe, which INPUT recently questioned, were satisfied with the technology and the benefits that it brings. It was widely recognised, however, that EDI is not being utilised to its full potential.

The problem is not predominantly technical, or one of standardisation. EDI users find that a lack of commitment to, and understanding of EDI internally, is the main barrier to the development of its use.

INPUT recently questioned 81 EDI managers and planners, in 8 European countries, on the usage and implementation of EDI within their respective organisations. The survey highlighted four main recommendations that apply to users intending to implement the technology, and vendors attempting to provide it:

- Be prepared for internal reorganisation.
- Expect and plan for an increase in workload in the short term.
- Enlist and encourage full management support.

- Provide/organise comprehensive training programmes.

Implementing these recommendations will help to encourage the use of EDI to its greatest advantage, and thereby enhance its image as a solution to business communication needs.

Many of the users questioned had not been fully prepared for the changes that using EDI would entail.

One of the main problems was introducing a new system that must initially be run in parallel to the old. Essentially, this produces problems of interorganisational communication and understanding. In order to counter this, organisations should be prepared through centralising EDI activities. Ideally this would be through the foundation of a department, or through the engagement of specific personnel dedicated to EDI internally.

Often, this essential focusing of activities is absent, leaving EDI as a further technical problem or complication for systems managers in what is already a highly complex environment.

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Many users were not prepared for the increase in workload that using EDI initially entails. During implementation and changeover from the original system, both must run in parallel, with greater use of EDI gradually being introduced.

An increase in workload is often not accurately planned for. This, in turn, creates problems of inefficiency in the short term, thereby holding back the process of implementation.

One of the biggest obstacles to the efficient use of EDI expressed by users was a lack of enough management level support. Although the final authority on the decision to implement EDI predominantly came from the executive level, actual continuing support from this level was lacking in any real depth.

Many respondents expressed a strong need for greater involvement of executive level management in order to enable a stronger corporate, or overall organisational support for its use. Additionally, it was felt that higher level involvement would help to coordinate EDI activities and prevent the situation in which different departments or divisions were involved in autonomous and inconsistent EDI projects. Higher level support, it was felt, would also facilitate the easier release of funds in order to supplement the project within the organisation, given that executive level management has greater control and decision making responsibilities in this area.

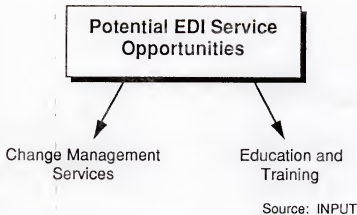
Also of particular importance was the need to train personnel more on EDI and its use. Not only are users finding EDI trained technicians in short supply, but internally EDI was not being utilised enough, due to a lack of understanding of the system. Training is of particular importance at

implementation; however, continued support from vendors or through internally generated training is equally essential. In essence, users are failing to take, or are not in a position to take, a proactive enough stance regarding EDI within their organisations. Many have been strongly encouraged, or in some cases given little choice in whether or not to use EDI, particularly in order to satisfy customers. As a result, many are taking a reactive position.

This means that EDI is sometimes regarded more as a complication or expense to an organisation, rather than as a solution to trading requirements. Of the 81 users questioned, only a very small percentage was able to assess the quantifiable benefits that using EDI had allowed. It is seen more as a cost than a saving, particularly because EDI had only been in use for one or two years. Despite this, there was obviously a lack of attempts by users to assess the impact of EDI in predicted or actual financial terms.

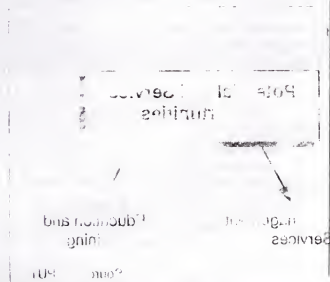
INPUT has identified two major requirements of EDI users, as illustrated in Exhibit 1.

Exhibit 1



In the absence of user internal organisational resources to cover these shortcomings, vendors are left with an important service opportunity. Vendors of EDI software and services should be prepared to provide a full-service level from implementation through to future ongoing maintenance and support. This should include:

- The targeting of high-level management in order to educate and engender full support for the technology.
- Emphasise and manage the business process change benefits of EDI rather than the technical aspects.
- Provide change management services throughout the process of EDI implementation.
- The provision of education and training in EDI throughout the organisation, not just at the technical level.



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